To:  Bidders

Date:  July 10, 2020

From:  Ben Hickman
       Project Manager & Architect, HDR

RE:  IMED CV Clinic – Bid Addendum No. 02
Narrative of document changes

Below is an outline describing changes to the IMED CV Clinic 100% Construction Documents (dated June 10, 2020) which incorporate comment pick-ups, and clarifications of design intent.

The Contract Documents for the above referenced Project are modified as set forth in this Addendum. The original Contract Documents and any previously issued addenda remain in full force and effect, except as modified by this Addendum, which is hereby made part of the Contract Documents. Bidder shall take this Addendum into consideration when preparing and submitting a bid, and shall acknowledge receipt of this Addendum in the space provided on the Bid Form.

General Notes and Revisions:

1. The Bid Due Date has been revised to July 16th, 2020; 4:00PM (MDT). All other bid submission requirements are consistent with Invitation to Bid document distributed by Intermountain.
2. Refer to attached Murray City permit review comments and responses to be accounted for in Bid. Refer to updated Drawings.
3. Refer to attached Intermountain forms to be used during construction administration.
4. Refer to attached Pre-Bid Meeting Agenda for items of additional coordination and compliance, i.e. ICRA requirements, safety requirements, etc.
5. During construction, a minimum of 72 hours notice must be provided to the Facilities prior to all shut-downs of existing building systems.
6. Please see attached Level 04 Reflected Ceiling Plan for reference only in order to better understand the ceiling conditions and access for under-slab work on Level 5. All ceilings must be field-verified.
7. Please see attached Record Documents of the C&S package for the South Office Tower (Building 1) for reference (separate attachment).
8. All existing floor boxes at rooms being demolished shall be removed; approximately 21 floor boxes were identified during pre-bid site walk. Refer to updated Drawings for additional notes about removal, patch, and repair of the existing slab.
9. The Water Treatment vendor/contact info should be the following in lieu of Nalco that was included in the previously issued Intermountain Supplier Database:
   a. WEST (Water & Energy Systems Technology, Inc.)
   b. Contact: Ben Ashcroft: bashcroft@west-utah.com, 435-730-4464

Revised Drawings: (Revisions clouded and tagged with delta 2)

Architectural:

G001:
   1. Revised year of International Fire Code Reference

G003:
G005:
1. Clarified naming of Drinking Fountain diagram

G150:
1. Added notes pertaining to site accessibility as directed by permit review comment.

G105:
1. Clarified occupancy type in Building Criteria
2. Revised Occupancy Calculations and square footages per occupant load in response to permit review comments.
3. Revised Plumbing calculations per permit review comments – no design changes necessary.
4. Updated travel distance 5B per permit review comments.
5. Added notes pertaining to existing conditions for elevators and public restrooms per permit review comments.

AD105
2. Added new locations of keynote 63 for roller shade removal / replacement.
3. Added keynote D65 for removal of operable partition and associated structure.

AI105
1. Refer to notes below in partial plan changes that are also shown on Overall Plan.

AI105.A
1. Added low wall and solid surface at several bracing locations for accessibility head clearance, refer to added keynote 49. Added reference to new elevation C6/AI450.
2. Adjusted location of Exam Rooms 5169 and 5170 to achieve required push clearance at door 5162.
3. Shifted wall/door at Door 5138 west and adjusted walls on east side of Lab/Blood Draw 5137 and Infusion 5146 to achieve required push clearance at door 5138.
4. Adjusted location of Door 5176 to achieve required push clearance.
5. Added Sheet Note 20.

AI105.B
1. Added low wall and solid surface at several bracing locations for accessibility head clearance, refer to added keynote 49. Added reference to new elevation C6/AI450.
2. Adjusted location of wall/door at Door 5113 to achieve required push/pull clearances.
3. Added Sheet Note 20.

AC105.A
1. Clarified Sheet note 17 for patching and repairing of all existing fireproofing.
2. Added additional locations of keynote 70 along west exterior wall.
3. Adjusted ceilings at locations of moved doors/walls noted on floor plans above.
4. Added keynote 72A for dual shades at Conference 5184.

AC105.B
1. Clarified Sheet note 17 for patching and repairing of all existing fireproofing.
2. Added additional locations of keynote 70 along west exterior wall.
3. Adjusted ceilings at locations of moved doors/walls noted on floor plans above.

AI401
1. Adjusted locations of equipment due to permit review comments.
AI402
1. Clarified locations of accessible registration/check-out stations in response to permit review comments.
2. Adjusted height of countertop at Ice Machine in Breakroom Elevation A3 in response to permit review comments.
3. Clarified location of accessible table in Breakroom 5104 in response to permit review comments.

AI420 & AI421
1. Added General Notes 2 & 3.
2. Clarified locations of WST0121 in several restrooms in response to permit review comments.
3. Added accessible clearances and turning spaces in response to permit review comments.
4. Clarified depth of SHL0915 to be 4”.

AI450
1. Added elevation C6 for typical low wall / solid surface top at perimeter structural bracing. Refer to keynote 49 locations on Partial Floor Plans.

AI541
1. Revised note in detail E5 for elec strike at CR locations in lieu of a Mag Lock.

AI601
1. Added General Notes 6 and 7 in response to permit review comments.
2. Added Door Note #8 to Door 5008.
3. Added General note to Door Types legend in response to permit review comments.
4. Dimensioned ladder pull at Door Type C.

Mechanical / Plumbing:

Refer to attached Mechanical Addendum #2 document for summary of drawing revisions

Electrical:

Refer to attached Electrical Addendum #2 Memo for summary of drawing revisions.

Revised Specifications (revisions highlighted):

08 32 13 MANUAL SLIDING DOORS – INTERIOR
1. Revised Door Hardware at card reader locations to elec strike in lieu of mag lock for single-operation egress.

08 71 00 DOOR HARDWARE
1. Notes added to Hardware Set 6.0 due to permit comments.

12 24 13 ROLLER WINDOW SHADES
1. Clarified 2.2 Materials for shades. Products shall match existing, verify in field.

21 10 00
1. Refer to Mechanical Addendum #2 Narrative.

22 61 13
1. Refer to Mechanical Addendum #2 Narrative.

22 62 13
1. Refer to Mechanical Addendum #2 Narrative.

22 63 13
1. Refer to Mechanical Addendum #2 Narrative.
23 25 13
1. Refer to Mechanical Addendum #2 Narrative.

28 13 00 ACCESS CONTROL
1. Revised system to Continental in lieu of Lenel.

Attachments & Supporting Documents

1. Mechanical Addendum #2 Narrative
2. Electrical Memorandum - Addendum #2 Narrative.
3. Updated Pre-bid RFI list with responses. Items 32 and beyond have been added since distribution of Addendum 1.
4. Pre-Bid Meeting Agenda discussed on July 1 for reference
5. Murray City permit review comments and responses.
6. Intermountain Forms
7. Revised Specifications as noted above
8. Revised Drawings as noted above (separate PDF attachment)
9. Level 04 RCP for reference (separate PDF attachment)
10. Base building C&S Record Documents for reference (separate PDF attachment)

------------------------------------------END OF NARRATIVE------------------------------------------

Cc: Todd Tierney, HDR
MECHANICAL ADDENDUM #2

DATE:  July 10, 2020

PROJECT NO:  18308

PROJECT:  CV Clinic

The following revision, additions, deletions, and/or items of clarification shall hereby be included as an integral part of the Contract Documents for the above-listed project and shall be fully binding. All other requirements shall remain in effect of the original plans and specification.

DIVISION – 21, 22 & 23

SECTION - 211000
1. Updated flow data information in section 1.5.D.1.

SECTION – 226113

SECTION – 226213
1. Paragraph 2.5.B – changed from Chemetron to Ohmeda.

SECTION – 226313

SECTION – 232513
1. Paragraph 2.1.A – changed from Nalco to WEST, Inc.

DRAWINGS

SHEET - ME001
1.  Added fire protection general note.

SHEET - M105
1.  Added general note addressing non-combustible materials within plenum.

SHEET - P105
1.  Add isolation valves to ALL branch take-offs to plumbing fixtures.
2.  Add water hammer arrestors to domestic cold water lines serving toilet rooms.
3.  Extend domestic hot water circulation loop to come within 2 ft of public toilet room lavatories per IECC.

SHEET - MG105
1.  Add expansion loop to O2 piping crossing the bridge.

End of Addendum

PRINCIPALS


Electrical:  Ryan C. Van Vleet, PE

Civil and Fire Protection:  David P. Baranowski, PE
To: Ben Hickman  
Company: HDR  
201 California St, Suite 1500  
San Francisco, CA 94111  
Date: July 9, 2020

From: Jay Disberger  
Job: IMED CV  
[p]: 801.401.8421  
Job No.: 20180431  
Distributed Via: E-Mail  
Email: jad@spectrum-engineers.com

MEMO

This memorandum addresses electrical modifications required as part of Addendum #2:

1) EE001  
   a. Wall Station added to symbol list.
2) EE105A  
   a. Data drop provided for Acudose security camera.
3) ED105A  
   a. Keynote #2 addressing demolished floor boxes added.
4) ED105B  
   a. Keynote #7 addressing demolished floor boxes added.
5) EP105A  
   a. Receptacle serving 5LE-4 relocated to avoid conflict with sliding door.
6) EP601  
   a. New panel AIC changed.
7) ELC105A  
      b. D-89 light fixture removed and E10-1 exit sign relocated to new door location for Team Core 5138.
8) ELC105B  
   a. E10-1 exit sign relocated to new door location for Team Core CL02J24.
9) ELC205A  
   a. Room tags added.
10) ELC205B  
    a. Room tags added.
11) ET105A-B  
    a. Data drop provided for Acudose security camera.
    b. General note added for cable tray grounding.
12) EY105A
   a. General sheet notes added for clarity on scope of work.
   b. Relocated card reader to new door location for Team Core 5138.
   c. Keynote #2 added to Card Reader Type 3 for clarity.

13) EY105B
   a. General sheet notes added for clarity on scope of work.
   b. Relocated card reader to new door location for Team Core CL02J24.

14) FA105A
   a. Fire alarm strobe relocated to new door location for Team Core 5138.

15) FA105B
   a. Fire alarm strobe relocated to new door location for Team Core CL02J24.
   b. Fire alarm strobe outside Multi-Purpose/Genetic Counsel 5112 relocated to avoid conflict with sliding door.

If you require any additional information, please contact me at (801).401.8421.

Regards,

Jay Disberger
EIT
Spectrum Engineers, Inc.
<table>
<thead>
<tr>
<th>Drawing/spec reference</th>
<th>Location</th>
<th>Pre-Bid RFI</th>
<th>Design Team Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 AI105.A</td>
<td>Grid 1-2/1-C.3 just south of door 5008</td>
<td>The wall just south of door 5008 terminates into the exterior wall. Should the partition closure detail DS/AL521 apply to this location?</td>
<td>The partition closure detail, if accurate and solid, should apply. GC to confirm during pre-bid site walk.</td>
</tr>
<tr>
<td>2 AI105.A</td>
<td>Grid 1-A and north of grid 1-A, Grid 1-A and south of grid 1-A, Grid 1-D and north of grid 1-D</td>
<td>should note 45 (patch and paint structural bracing) apply to these locations as well?</td>
<td>Yes, note 45 should apply to all existing exposed structural bracing on the entire floor. See attached revised drawings.</td>
</tr>
<tr>
<td>3 AI105.B</td>
<td>Grid 1-A and north of grid 1-5, Grid 1-A and south of grid 1-5</td>
<td>should note 45 (patch and paint structural bracing) apply to these locations as well?</td>
<td>Yes, note 45 should apply to all existing exposed structural bracing on the entire floor. See attached revised drawings.</td>
</tr>
<tr>
<td>4 AI105.B</td>
<td>Mechanical shaft and Existing Electrical room 5102</td>
<td>M105 calls for a duct to pass through this wall. To do this, the wall will need to be opened up, with a work platform installed and the wall to be patched back. Refer to question 24. Drawing AI521 does not indicate this wall needs to be patch/patched/repair. Please confirm it needs to be.</td>
<td>Confirmed, all existing conditions impacted by scope of work shall be patched and repaired consistent with General note 5 on Enlarged Reflected Ceiling Plans and Specification 01 73 29 CUTTING AND PATCHING. All Interim Infection Control Measures shall be provided by GC per specification 01 35 32 consistent with IMED's Infection Control guidelines.</td>
</tr>
<tr>
<td>5 AI521</td>
<td>Grid 1-A and north of grid 1-A, Grid 1-A and south of grid 1-5, Grid 1-D and north of grid 1-D</td>
<td>should note 45 (patch and paint structural bracing) apply to these locations as well?</td>
<td>Yes, note 45 should apply to all existing exposed structural bracing on the entire floor. See attached revised drawings.</td>
</tr>
<tr>
<td>6 AI521</td>
<td>Detail A1 and B1</td>
<td>Fire Extinguisher signage shall be provided by contractor.</td>
<td></td>
</tr>
<tr>
<td>7 AI521</td>
<td>Detail B3</td>
<td>We cannot find this detail called out on the plans. Please clarify where it applies.</td>
<td>This detail is not currently scheduled to be used in the project and can be disregarded.</td>
</tr>
<tr>
<td>8 AI541</td>
<td>Door 5103</td>
<td>The detail used on the level 4 remodel had a 2&quot; tall sill. Should this project match the level 4 project or stay with the 4&quot; as shown?</td>
<td>No, lower sill to be 4&quot; as scheduled in order to conceal wiremold at several shared Workroom locations. Refer to Elec drawings.</td>
</tr>
<tr>
<td>9 AI105.A</td>
<td>Conference Room 5184</td>
<td>The HDMI instructions were changed in RFI 101 of the level 4 remodel project. Attached for reference. This condition appears similar. Should the note stay as is or change to match RFI 101?</td>
<td>The HDMI instructions were changed in RFI 101 of the level 4 remodel project. Attached for reference. The keynotes have been revised to provide a connector in the poke through device.</td>
</tr>
<tr>
<td>10 EI105.A</td>
<td>Front Entrance Door 5001</td>
<td>The two handwave actuators from hardware set 1.0 are not shown. Please advise.</td>
<td>The actuators have been added to the plan.</td>
</tr>
<tr>
<td>11 EI105.B</td>
<td>Conference Room 5103</td>
<td>The HDMI instructions were changed in RFI 101 of the level 4 remodel project. Attached for reference. This condition appears similar. Should the note stay as is or change to match RFI 101?</td>
<td>The HDMI instructions were changed in RFI 101 of the level 4 remodel project. Attached for reference. The keynotes have been revised to provide a connector in the poke through device.</td>
</tr>
<tr>
<td>12 EI105.B</td>
<td>Conference Room 5103</td>
<td>The HDMI instructions were changed in RFI 101 of the level 4 remodel project. Attached for reference. This condition appears similar. Should the note stay as is or change to match RFI 101?</td>
<td>The HDMI instructions were changed in RFI 101 of the level 4 remodel project. Attached for reference. The keynotes have been revised to provide a connector in the poke through device.</td>
</tr>
<tr>
<td>13 ELC105.A</td>
<td>Echo/EKG/PV 5152</td>
<td>the lights are missing callouts. Please confirm they should be G-1 and UC-99</td>
<td>The tags have been added to the plan.</td>
</tr>
<tr>
<td>14 ELC105.B</td>
<td>Echo/EKG/PV 512S</td>
<td>The light in the SE corner is missing the callout. Please confirm it should be UC-99</td>
<td>The tags have been added to the plan.</td>
</tr>
<tr>
<td>15 ELC105.B</td>
<td>Echo/EKG/PV 5111</td>
<td>There are (2) UC-99 lights in this room. Other similar rooms only show (1). Should there be 2?</td>
<td>The plan has been coordinated with the correct quantity.</td>
</tr>
<tr>
<td>16 T105.B</td>
<td>Existing electrical room/Conference Room 5103</td>
<td>The cable tray is shown to go through the wall between these two rooms. The existing conditions in the electrical room will not allow this to happen without reworking other existing systems. A picture has been attached for reference. Please advise.</td>
<td>This is a means and method item which will need to be accounted for during bid by the contractors. Provide fire-rated cable tray penetration to maintain existing rating.</td>
</tr>
<tr>
<td>17 EY105.A</td>
<td>Door 5008</td>
<td>This delayed egress exit device is so far away from the reception area that they won't be able to hear the alarm. Should a remote alarm be added at the registration desk? Also, a physical key is required to silence the alarm. Should this be altered so a valid badge read can silence the alarm and reset the lock?</td>
<td>Yes, a remote alarm should be added to the registration. This system does not allow for a badge read to silence the alarm - provide physical key as scheduled.</td>
</tr>
<tr>
<td>18 EY105.A</td>
<td>Door 5007B</td>
<td>The drawing is missing the card reader information. This door is in HW set 7 which has a card reader. Please advise.</td>
<td>Card reader will be added - refer to updated drawings in Addendum 1.</td>
</tr>
<tr>
<td>19 Y105.B</td>
<td>Door 5101</td>
<td>The drawing is not showing any work scope at this existing door. It has an existing card reader. The hardware is called out to be salvaged. Please confirm this the card reader is to be reinstalled/programmed.</td>
<td>Refer to updated drawings in Addendum 1.</td>
</tr>
</tbody>
</table>
20 EY601 The sheet is missing the card access door type schedule. Please provide. Refer to updated drawings in Addendum 1.

21 SOS Clean/EQ/Supply The wall protection on the west wall is missing a callout. Please confirm SWP1 should be installed here. Confirmed, provide SWP1 at this location.

22 SOS Med 5117 The CG1 corner guard is not called out on the west corner. Please confirm one should be installed here. Confirmed, add CG1 at this location.

23 SOS Equip 5141 Two CG1 corner guards are missing a callout. Please confirm CG1’s should be installed here. Confirmed, add CG1s at these locations.

24 M105 Mechanical shaft and Existing Electrical room 5102 The bathroom exhaust line is shown to jog to the west and penetrate into the shaft and connect into the existing grease exhaust duct. 1. Inside the shaft there is no working platform. This same exhaust change was done on the level 4 remodel and required a working platform to be added as documented in RF1 113. Attached for reference. Please confirm this should be done on this project as well. 2. The existing conditions above the ceiling in the electrical room do not provide enough space for this duct to pass through this room and penetrate into the shaft. Please advise. Refer to Invitation to Bid distributed to Bidders for pre-bid conference schedule. Coordinate exact time of scheduled sitewalk with Intermountain’s Project Manager, Steve Kelly. On-site walks will be held during 30 minute windows with each Bidder. Subcontractors are allowed, but must attend during their appropriate 30 min window.

25 General Invitation to Bid Will there be a pre-bid conference or walk-through? If so, will this be limited to General Contractors or will Subcontractor be able to walk through the area? No security or Performance bonds are required. Please use attached updated Bid Form in lieu of the previous version included in Project Manual.

26 General Bid Form There is mention of a bid security/bid bond. Is this required for this bid? If so, is it a 5% or 10% bid bond? The bid form indicates that we are to write in a dollar amount. Typically bid bonds are a percentage of the bid amount, and the percentage is specified by the owner. No security or Performance bonds are required. Please use attached updated Bid Form in lieu of the previous version included in Project Manual.

27 General Bid Form There is mention of a payment and performance bond. Is a payment and performance bond required on this project? The area on the bid form that mentions the payment and performance bond has an area that is looking for something for bidders to write in. What are we supposed to write into that area? The name of our bonding company? A. GC to provide and it can be further discussed after award if they prefer the owner pay it. There are other city permits required such as mechanical, electrical and fire sprinkler, etc... that are the responsibility of the GC to obtain and pay for. B. Correct; by Owner.

28 General Bid Form Please provide the hazardous material survey for this work area. See attached included in Addendum 1.

29 General Bid Form Please provide the hazardous material survey for this work area. See attached included in Addendum 1.

30 General Bid Form Please provide the hazardous material survey for this work area. See attached included in Addendum 1.

31 General Glazing Specification 28 31 11 - 4, 2.1 A list both Notifier and Siemens as approved fire alarm manufacturers. Please confirm which manufacturer is the currently being used in the building. Siemens

32 Fire Alarm 33 Glazing Film Please confirm if doors in rooms 5103, 5174B, 5175-5181, 5185, 5187-5190 are to receive DF1. Confirmed - refer to Door notes #2 on AI601 Door and Frame Schedule.

34 Glazing Film Rooms 5103 and 5175 are not labeled to receive DF1. Please confirm these rooms are not to receive film on storefront systems. Confirmed - refer to Door notes #2 on AI601 Door and Frame Schedule.

35 Existing Conditions Please provide floor to deck height. Nexus Record Documents indicate a 14'-0” floor-to-floor height from Level 5 to Level 6. Refer to attached record documents for reference.

36 EY602 Nurse Call Please confirm HILLROM nurse call systems is by owner and contractor is to provide pathways. See response below to pre-bid RF1 51.
<table>
<thead>
<tr>
<th>#</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>08 11 13-5 Door Frames</td>
<td>Specification 08 11 13 paragraph D states to provide hospital stop where indicated. No location for the hospital stops are shown in the drawings. Please confirm if hospital stops are required. If required please provide locations. Hospital Stops are not required in this project.</td>
</tr>
<tr>
<td>38</td>
<td>EY &amp; FA Dwgs Vendors</td>
<td>Regarding the following low voltage systems, please provide application information regarding systems manufacturers, makes, models, proprietary/contracted vendor contact information, etc.: Fire Alarm, Access Control, CCTV, Sound Masking, TV Distribution. Refer to project specifications: Fire Alarm - Siemens - Contractor to verify exact system details in impacted space. Access Control - Alhacorp/Convergent sole designated supplier per specifications. CCTV - Alhacorp/Convergent sole designated supplier per specifications. Sound Masking - Marshall Industries TV Distribution - Refer to Intermountain Division 27 Specifications.</td>
</tr>
<tr>
<td>39</td>
<td>EE Dwgs Elec Panels</td>
<td>Regarding Panels SFE and SLE, please provide applicable information on the location of the panel that feeds SLE and SFE. Refer to on line diagram added in Addendum #1.</td>
</tr>
<tr>
<td>40</td>
<td>P-105 Isolation Valves</td>
<td>It is an Intermountain Healthcare standard to have Isolation Valves on the Hot and Cold water of each sink unless it can be isolated within a bathroom group. On sheet P-105 some sinks have Isolation valves and some do not. Please advise on if Isolation Valves will be needed? Yes, all sinks will require isolation valves. Refer to updated Addendum #2 Drawings.</td>
</tr>
<tr>
<td>41</td>
<td>A Dwgs Manual Shades</td>
<td>There are a few locations that currently have dual manual shades. At those locations, will the dual shade headbox need to be changed out to a single shade headbox, or will the dual headbox stay? Yes, existing dual manual shades need to be replaced and changed out to single shade headboxes. The existing ceiling will need to be modified, patched, and repaired as required. Refer to updated drawings.</td>
</tr>
<tr>
<td>42</td>
<td>Specs Tile Mortar</td>
<td>The specs call for epoxy mortar for setting tile. Is it acceptable to use a more common cementitious thinset mortar for setting tile? Epoxy mortar is not required - cementitious thinset mortar is acceptable - refer to specification 09 30 00. However, epoxy grout must be used at tile locations as specified.</td>
</tr>
<tr>
<td>43</td>
<td>A Dwgs Existing conditions</td>
<td>Is there a pony wall at the exterior window bottom perimeter of this project (that would need to be painted)? Refer to attached Nexus Record Documents for the C&amp;S design of the building.</td>
</tr>
<tr>
<td>44</td>
<td>A Dwgs Existing conditions</td>
<td>The round columns were originally painted with Zolatone paint. What are going to be done with these, if anything? Unless indicated to be removed on demolition plans, existing round column covers are to remain, be protected, and patched/repai red as required for continuous uniform finish. See response to pre-bid RFI above.</td>
</tr>
<tr>
<td>45</td>
<td>Specs HM Door &amp; Frames</td>
<td>In the hollow metal door and frame specification, there is a note that says “hospital stops, provide where indicated.” But these aren’t indicated on the specs or plans. Are there any hospital stops built into the door frames on this project? Several approved manufacturers are listed in specification 08 12 16. Other products and manufacturers would be considered, but a fully complete substitution request form must be provided, including a point-by-point comparative data analysis. If the complete form is provided, this will be reviewed by the Architect and Owner.</td>
</tr>
<tr>
<td>46</td>
<td>08 12 16 Interior Alum Doors &amp; Frames</td>
<td>Are other storefront systems acceptable on the project with a compliant substitution request form? Provide abuse resistant gypsum board at locations described in specification 09 29 00 2.2.1.5.a - &quot;corridors, passageways, waiting and sub-waiting areas, and similar high traffic areas.”</td>
</tr>
<tr>
<td>47</td>
<td>Specs GWB</td>
<td>The specs call for some abuse resistant gypsum board. Will you clarify the locations for abuse resistant gypsum board? Several approved manufacturers are listed in specification 08 12 16. Other products and manufacturers would be considered, but a fully complete substitution request form must be provided, including a point-by-point comparative data analysis. If the complete form is provided, this will be reviewed by the Architect and Owner.</td>
</tr>
<tr>
<td>48</td>
<td>ELC105B Lighting</td>
<td>Note #3 on ELC105B shows an emergency pack and emergency transfer switch on some of the lay in lights. Does this note apply to all em lay in lights and also any of the other fixtures designated as emergency? The referenced note is a keynote which appears next to the fixtures requiring the device to allow switching and automatic transfer to emergency. Refer to the plans for locations as keynoted (also refer to Addendum #1).</td>
</tr>
<tr>
<td>49</td>
<td>E Dwgs Lighting</td>
<td>The lighting plans call for ceiling occupancy and vacancy sensors but no power packs are shown. I assume these are needed? All devices necessary to implement the indicated switching/control are intentionally not shown on the plans; the contractor is responsible for providing all components necessary to achieve the indicated switching and control configurations.</td>
</tr>
<tr>
<td>50</td>
<td>EL 601 Lighting</td>
<td>On sheet EL 601 there is a note on the top of the sheet showing owner provided fixtures. Are these to be deducted out of the total quantity listed on the plans? Are these owner provided fixtures that are listed coming out of the demo phase? Yes, these are deducted out of the total quantity listed on the plans. These are not coming out of the demo phase, but are attick stocked from a prior project.</td>
</tr>
<tr>
<td>Page</td>
<td>Section</td>
<td>Description</td>
</tr>
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</tr>
</tbody>
</table>
| 186 | Nurse Call | Is nurse call provided by the owner (IHC)? Is just rough-in to be included in our bids? Hillrom will be contracted by Intermountain for installation of the nurse call devices and certain cabling (and possibly all cabling depending on final contract). However, pricing should be based on the following: The contractor scope of work will include:  
   a) installation of the rough-in (boxes and conduit) for the nurse call devices in coordination with the Hill-Rom installation documents;  
   b) installation of the cabling from the hospital and/or clinic data room (TDR) to the room controller (RCB) locations. The Hill-Rom (or subcontractor) scope of work contracted directly with Intermountain will include:  
   a) installation of the cabling from the room controller (RCB) location to the individual devices within each room;  
   b) installation of the nurse call devices;  
   c) functional testing of the nurse call system. |
| 186 | Lighting | In the Addendum 1 Drawings (drawing ELC105A) there is a new fixture type (WS) shown that is not on the Addendum 1 fixture schedule (EL601). Can we get an updated fixture schedule with the description of the WS type fixture? The “WS” is a wall station switch for the relay based lighting control system for override and on/off control. Symbol and clarification to the documents has been included in updated Addendum #2 Drawings. |
| 186 | Access Control | Please confirm that the Access Control system should be Continental instead of Lenel. Confirmed - Access control system shall be Continental. Refer to updated specification. |
| 186 | Door Hardware | Will Allegion hardware be an acceptable substitution for Door Hardware? Per IMED Plant Operations:  
   - Locking devices must remain Sargent to match existing locking devices in the building.  
   - Von Duprin products are an approved substitution for other hardware.  
   - Sargent door closers are the preferred closer of the facility - #281-uo EN.  
   - Ive Hinges are an acceptable substitution.  
   - Steelcraft doors are an acceptable substitution.  
   - LCN products are not an acceptable substitution. |
PRE-BID CONFERENCE AGENDA

PROJECT ID | NAME: #100007233 | IMED CV Clinic

DATE: July 1, 2020
TIME: 2:00 PM
LOCATION: WebEx

1. INTRODUCTIONS & SIGN-IN
   a. Intermountain – FD&C, Facility Management, Infection Prevention, and others as required
   b. Architect – HDR

2. PROJECT INFORMATION & OVERVIEW
   a. Project Overview and Description – Architect
   b. Availability of Plans: June 15, 2020
      1) PDF of Plans and Specs – Please email Architect
      2) CES and R (Request from FD&C PM) - (2) Sets of Plans and Specs
   c. Intermountain Forms (e.g. Certification and Payment Application, RFIs, ASIs, PR, PCOs, COs, etc.)
   d. Bid Form
      1) Base Bid
      2) Alternates: 1 Add 220V receptacles for 3 treadmill locations in Stress Test Rooms
      3) Unit Prices: None required
   e. Construction Schedule (calendar days, Date of Substantial Completion, and winter weather delay days)
   f. Bidder Questions & Addenda
      1) Submit all questions to the architect
      2) Bidder Questions and Substitution Requests Due: Tuesday, July 7, 2020
         a) All questions shall be submitted in writing to Architect.
      3) Addenda Deadline (exception for bid delays): Friday, July 10, 2020
   g. GC to Sign & Seal Bid Form
      1) Subcontractor List and Schedule of Values (submit with Bid Form or within 24 hours of bid submission)
   h. Bid Due Date & Time: Tuesday, July 14, 2020 at 4:00 PM
      1) Bids can be hand delivered to security on 16th floor or emailed to Shannon Brown (email: Shannon.Brown@imail.org)

3. OWNER ITEMS
   a. Facility Management Required Meetings
      1) Site Orientation Meeting
      2) Intermountain Construction Safety Requirements
      3) Other required permits (e.g. interim life safety measures [ILSM], above-ceiling, hot-work, utility shutdowns, medical gas certification, etc.)
   b. Infection Control Risk Assessment (ICRA) Permit form and process and Preconstruction Risk Assessment form – Infection Prevention
      1) Initial approvals and acknowledgement of ICRA and Preconstruction Risk Assessment requirements by Contractor prior to commencing work
      2) Final approvals are required prior to ICRA barriers being removed (ICRA barriers cannot be removed until after all Intermountain vendors and dusting activities are complete)
      3) ICRA permits are required for post occupancy construction work, including warranty work
      4) Approved ICRA permit and required daily pressurization logs are posted at the job site entrance
      5) Emergency contacts, including FD&C PM’s contact, to be posted at the job site entrance
   c. Other Contractor Requirements
      1) Facility shall remain operational during the duration of construction
      2) Covered carts (cover must be tight fitting), transporting of materials, carts and wheels must cleaned to and from job site when transporting within facilities
3) Contractor Required Equipment for project must include the following, but is not limited to (verify what equipment can be provided by facility for contractor use):
   a) ICRA barrier(s)
   b) Containment cart(s)
   c) HEPA vacuum(s)
   d) Negative Pressure machine(s) / HEPA air scrubber(s)
   e) Sticky mat(s) at construction entrance/exit
   f) Carts and cart covers (covers must be tight fitting)
4) Facility Access – Reptrax [https://www.sec3ure.com/login]
   a) General Contractor and subcontractors will need to complete Reptrax documents (select non-patient care). Once all required Reptrax requirements have been completed, go to the local facility materials management and facility management teams for confirmation, signature, and other requirements, and then go to the facility security team for printed ID badges
   i. Background check and immunizations will be required
d. All work performed by the contractor and subcontractors shall be in accordance with certain policies and procedures and all applicable regulations, codes, regulatory agencies, and applicable local, State, and Federal laws including OSHA regulations
   e. OFCI Equipment (Data/Telecom, Furnishings, etc.) – See Responsibility Matrix in Project Manual/Drawings
   f. Working Hours – local facility and AHJ Requirements
   g. Special Considerations (Site, Utilities, Patient Safety, Coordination of work with facility, etc.)
h. Asbestos, Lead and Universal Hazardous Waste Coordination
   1) Contractor to coordinate with Owner and Asbestos Abatement Firm
   i. Insurance Requirements – per the contract
   j. Sole Source Agreement and Preferred Pricing Vendors – see Addendum 1
   k. Approved Building Controls Contractors (Div. 230900): Match existing - Siemens
m. IHC Health Services, Inc. is a Tax-Exempt Corporation
   n. Plan Rooms – not allowed, contractors will be disqualified.

4. QUESTIONS

5. SITE TOUR
   a. Due to COVID-19 requirements, site tours will be conducted in 30-minute blocks for each bidder. Subcontractors can be included but please limit attendee count to 10
   b. Address: 5171 S. Cottonwood St. (Building 1 – South Office Tower), Murray, UT 84107
July 1, 2020

Murray City
Building Inspection Division
4646 South 500 West
Murray, Utah 84123
Phone: (801) 270-2431

Attention: Steve Reid Building Official

Subject: IMC Cardiovascular Clinic – Architectural Only - Plan Review Comments 1st Review

Mr. Reid:

West Coast Code Consultants, Inc. (WC³) has completed the first review (Architectural Only) of the proposed IMC Cardiovascular Clinic project located in Murray, UT. This review was based upon the following:

2. Mechanical and Plumbing drawings by VBFA, sealed and signed by Donald K. Bradshaw, Professional Engineer.
3. Electrical drawings dated 6/10/2020 by HDR Architecture, sealed and signed by Carlton A. Getz, Licensed Professional Engineer. An Interior Lighting Compliance Certificate (ILCC) was also provided.

The 2018 International Codes and 2017 NEC, as adopted by the State of Utah, were used as the basis of our review. Specific comments regarding this project are enclosed with this cover letter. If you have any questions regarding this review, please contact me.

Sincerely,

Alexa Nielsen,
Plans Examiner

Attachment: Comments
Plan Review Comments

Project Name: IMC Cardiovascular Clinic
Location(s): 5121 South Cottonwood Street, Murray, UT

Code Review by: Alexa Nielsen
MEP by: George Williams

OCCUPANCY & BUILDING SUMMARY:

<table>
<thead>
<tr>
<th>Type of Construction</th>
<th>Use Group(s)</th>
<th>Occupant Load</th>
<th>Risk Category</th>
<th>Area of Work (Level 5)</th>
<th>Building Height</th>
<th>Sprinklers</th>
</tr>
</thead>
<tbody>
<tr>
<td>II-A*</td>
<td>A*, B</td>
<td>242*</td>
<td>II</td>
<td>18,238 ft²</td>
<td>9-story, Existing</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* - Items noted with an asterisk may change as a result of the plan review comments.

GENERAL INFORMATION:

The submitted documents for the above-mentioned project, as outlined in the cover letter, have been reviewed. The following comments address areas of concern, non-compliance with the governing code, potential errors, or omissions in the proposed design. The appropriate design professional must address each comment below and submit a written response in addition to revised plans and calculations if necessary. Please cloud any revisions made to the construction drawings and provide the date of the latest revision on each revised sheet.

CODE REVIEW COMMENTS (Design Team Responses in red):

A1. Sheet G001: Please address the following:
   A. Applicable Codes: Please revise the reference to the 2015 IFC to reference the 2018 IFC as adopted by the State of Utah. Response: Reference has been updated to 2018, refer to updated drawings.
   B. Please clarify if any of the other existing emergency systems in the building (smoke detection, fire alarm, voice/alarm, responder radio, etc.) required per IBC Section 403.4 will be updated based on the revised layout of this floor. If so, please include these systems on the deferred submittal list.
      I. Please also verify these systems exist in this high-rise structure, in accordance with IBC 403.4.
      Response: Existing emergency systems in the building are in accordance with IBC 403.4. The systems will be modified within the scope of work to accommodate the new space layout, but are not being upgraded. The fire alarm drawings will be s deferred submittal. The existing responder radio will not be impacted by this project and is managed directly between Intermountain and their vendor contract.

A2. Sheet G105: Please address the following:
   A. Code Analysis: Please address the following:
      I. Occupancy Classification: Please clarify the type of Assembly occupancy proposed in this structure in accordance with IBC Section 303.1. Response: The occupancy in the proposed scope of work will be B Occupancy per Section 303.1. The only assembly spaces will be...
accessory occupancies per IBC 508.2. Building criteria has been updated on Drawing to indicate B-Business occupancy.

II. Allowable Height & Area: Based on the provisions of IBC Section 508.3, the non-separated uses proposed on this level shall comply with the most restrictive requirements of the uses proposed. Please address the following:

   a. Per IBC Table 504.4, the assembly occupancies are limited to no more than 4-stories above grade. As this project is located on the fifth story the assembly occupancies are not permitted. Please address per IBC 508.3.2. Response: See response to A, I. The occupancy in the proposed scope of work will be B occupancy per Section 303.1

III. Please verify the type of construction for this structure is II-A, as it appears the existing structure may be of I-A construction based on the number of existing stories and the provisions of IBC 403.2.1. Response: Confirmed; existing construction type is II-A as noted in record drawings for original construction provided by Nexus.

IV. Occupant Load Calculations: Please address the following:

   a. It appears the occupant load factor used for the Business areas is 100 sf per occupant. However, in the 2018 IBC this load factor has been changed to 150 sf per occupant. Please revise the calculations accordingly, per IBC Table 1004.5. Response: Occupant load factor has been updated to 150 sf/person and calculations updated accordingly. Refer to updated Drawings.

   b. It appears Conference Room 5103, Breakroom 5104, and Conference 5184 have been included in the occupant load calculations for the business occupancy. However, as the function of these spaces is assembly, the occupant load of these rooms should be calculated as such. Please address per IBC Table 1004.5. Response: Occupant load for these spaces has been updated to 15 sf/person. Refer to updated Drawings.

   c. It appears the occupant load calculations for the accessory waiting area use a 15 sf per occupant load factor. However, it appears that a majority of these assembly areas are seating only and only a few of these spaces, if any, have tables and chairs. Please revise the occupant load calculations according per IBC Table 1004.5. Response: Occupant load for the accessory assembly waiting area has been revised to 7 sf/person and calculations have been updated. Refer to updated Drawings.

   d. The occupant load of the assembly areas needs to be posted in accordance with IBC 1004.9. Response: Note has been added to post occupant load for accessory assembly areas per IBC. Refer to updated Drawings.

V. Plumbing Fixture Calculations: Please address the following:

   a. Please revise the plumbing fixture calculations to clarify the required and provided fixtures for each gender in accordance with IBC 2902.1.1 to verify sufficient fixtures have been provided for each gender. Response: Plumbing calculations have been updated to indicate required and provided fixtures for each gender. Refer to updated Drawings.

   b. The fixture calculations indicate that three (3) drinking fountains are required but only two (2) fountains and one (1) water cooler are being provided. Water coolers are not permitted to be substituted for drinking fountains. Please address. Response: IBC Table 2902.1 refers to section 410 of the IPC. 2018 IPC Section 410.4
Substitution notes that “water dispensers shall be permitted to be substituted for not more than 50 percent of the required number of drinking fountains”.

i. Please ensure the plans clearly identify the wheelchair and standing drinking fountains to be provided in accordance with IBC 1109.5.2. Response: Confirmed, refer to dimensional requirements noted on sheet G005. Label will be clarified from “ELECTRIC WATER COOLER” to “DRINKING FOUNTAIN”.

B. Egress Plans: Please address the following:

I. Egress Sizing Calculations: The egress sizing calculations appear to be using reduced sizing factors. Per the Exception 1 in Sections 1005.3.1 and 1005.3.2 of the IBC. In order to use the sizing reductions specified (0.2 – stairs and 0.15 – doors) the plans must clearly indicate that both a sprinkler system and emergency voice/alarm communication system will be provided per IBC 907.5.2.2. Response: Confirmed, both a sprinkler system and emergency voice/alarm communication system are existing to remain per IBC 907.

a. If both of these systems are not provided the egress sizing factors will need to be revised to be in compliance with IBC Section 1005.3.1 and 1005.3.2 (0.3 – stairs and 0.2 – doors). Response: N/A, see above.

II. Conference Room 5103 & Breakroom 5104: Please address the following:

b. Based on the assumed occupant load of these combined spaces, it appears that two exits will be required from this space per IBC Table 1006.2.1. Please address the following: Response: The occupant load for this room is 36 people, and therefore does not require 2 exits.

i. Doors 5103 and 5104 have not been sufficiently separated. Please address per IBC 1007.1.1 where two exits are required from this space.

Response: N/A, see above

ii. The swing of Doors 5103 and 5104 will need to be reversed if the occupant load of these combined rooms exceeds 50. Please address per IBC 1010.1.2.1.

Response: N/A, see above

III. The below path of travel appears to go through a wall. Please revise the travel distance measurement accordingly.

Response: Travel distance and measurement have been corrected; refer to updated Drawings.
IV. IBC 1013.4 requires that tactile exit signs be provided at the entrances to the stairways and at all exterior exit doors. Please address. **Response:** Per Record Documents, code-compliant signage has been provided at all existing entrances to stairways.

V. The plans indicate an existing horizontal exit provided on this level. Please provide refuge area calculations in accordance with IBC 1026.4, as the occupant load on one side of the horizontal exit has changed and information needs to be provided showing the existing area of refuge is sufficient to serve this new occupant load. **Response:** The updated occupancy for the floor is 261 occupants, which would require 783 sf of refuge area (per 3/sf noted in 1026.4). The existing Elevator Lobby is 811 SF (refer to updated G105), which is greater than the sf required.

C. Provide details for the mounting of Fire Extinguishers and verify the fire extinguishers will not project more than 4 inches over the walking surface as required by IBC 1003.3.3. This may require recessed fire extinguisher cabinets. **Response:** Refer to details A1 and B2 on sheet AI521. FEC’s will not project more than 1 ½” into the walking surface.

A3. Sheet AI105: Please address the following:

A. Several of the proposed soiled linen rooms and spaces (5120, 5126, 5145, and 5168) are over 100 square feet, per IBC Table 509 this is an Incidental Use. Please address the following in accordance with IBC 509.4.2: **Response:** None of the rooms listed above are over 100 square feet. The walls surrounding these alcoves are only 5'-0" tall, and are simply alcoves and are not housing any items that would require an enclosed room per FGI and IBC.

I. The doors leading into these rooms/spaces must be provided with self-closers and limit the passage of smoke. Please address for all affected doors. **Response:** N/A, see above

a. The above comment also applies to Sheet AI601. **Response:** N/A, see above

II. Walls for these rooms and spaces are required to extend to the underside of the floor/ceiling assembly or the deck above and be capable of resisting the passage of smoke. Please clearly detail how this will be achieved. **Response:** N/A, see above

III. Any ducts or air transfer openings serving this room are required to be provided with Smoke Dampers. Please coordinate with the mechanical design team to ensure this is provided. **Response:** N/A, see above

A4. Sheet AI105.A: Please address the following:
A. Door 5176: It appears the existing wall overlaps the push clearances for this door. This is not permitted by ICC A117.1-09 Section 404.2.3.2. Please address. **Response:** Location of door has been adjusted to provide the required push clearances. Refer to updated Drawings.

B. Door 5162: It does not appear this door has been provided with sufficient push maneuvering clearances. Please address per ICC A117.1-09 Section 404.2.3.2. **Response:** Layout has been adjusted to provide the required push clearances. Refer to updated Drawings.

C. Door 5007A: It does not appear this door has been provided with sufficient pull maneuvering clearances. Please address per ICC A117.1-09 Section 404.2.3.2. **Response:** Door is equipped with an automatic door opener and hand-wave actuators from both directions, so maneuvering clearances are not required.

D. Door 5138: It does not appear this door has been provided with sufficient push or pull maneuvering clearances. Please address per ICC A117.1-09 Section 404.2.3.2. **Response:** Layout has been adjusted to provide the required push and pull clearances. Refer to updated Drawings.

A5. Sheet AI105.B: Please address the following:

A. Door 5113: It does not appear this door has been provided with sufficient push or pull maneuvering clearances. Please address per ICC A117.1-09 Section 404.2.3.2. **Response:** Layout has been adjusted to provide the required push and pull clearances. Refer to updated Drawings.

B. Door 5100B: It does not appear this door has been provided with sufficient push or pull maneuvering clearances. Please address per ICC A117.1-09 Section 404.2.3.2. **Response:** Door 5100B is not along the path of an accessible route and is only a secure door to limit access into Shell Space 5100. Once the shell space is renovated in the future, Door 5100B will be removed.

A6. Sheet AI401: Please address the following:

A. Detail B1: DIS0073 and C-344270 appear to be located in the pull maneuvering clearance of the door. This is not permitted. Please address per ICC A117.1-09 Section 404.2.3.2. **Response:** These items have been relocated outside of the pull maneuvering clearance. Refer to updated Drawings.

B. Detail E1: DIS0073 appears to be located in the pull maneuvering clearance of the door. This is not permitted. Please address per ICC A117.1-09 Section 404.2.3.2. **Response:** This item has been relocated outside of the pull maneuvering clearance. Refer to updated Drawings.

A7. Sheet AI402: Please address the following:

A. Registration: IBC 1109.12.3 requires that at least one of each type of service counter (registration and check-out) provided is accessible. Please identify the accessible service counter(s) to be provided at the general office area and provide sufficient details showing how compliance with either a parallel or forward approach per ICC A117.1-09 Section 904.3 has been achieved. **Response:** Two registration and one check-out accessible locations are provided per section 904.3. Additional notes have been added to B1/AI402; refer to updated Drawings. Refer to enlarged plans, elevations, and details for sizes and heights of accessible locations.

B. Breakroom (Details A1 & A3): Please address the following:

   I. Verify that 5% of the dining surfaces provide (tables and bar) shall be accessible as required by IBC 1108.2.9.1. **Response:** confirmed – a minimum of 5% of the dining surfaces will be accessible. Refer to note added to AI402 for location of accessible table.

      a. Please provide details showing how these accessible dining surfaces comply with Section 902 of ICC A117.1-09. **Response:** Table indicated will on plan will comply
with all requirements of Section 902. Refer to G003 & G004 for diagrams of clear floor space, knee, and toe clearance requirements. Furniture selection is ongoing and being completed by Owner’s furniture vendor.

II. Please verify that the operable parts for the coffee and ice machines shall be within the accessible reach ranges outlined in Section 308 of ICC A117.1-09. Response: Coffee maker size will ensure that operable parts are within reach ranges outlined in Section 308. Per equipment cut-sheets provided in project manual, the operable parts of ice machine are located approximately 16.7” above the surface which it is sitting. Countertop has been lowered to ensure that these parts are located within reach ranges outlined in Section 308; refer to updated Drawings.

a. These operable parts must also comply with Section 309 of ICC A117.1-09. Response: Confirmed; operable parts will comply with Section 309.

A8. Sheet AI420: Please address the following:

A. Details A1 – D1: Please address the following:

I. Section 604.6 of ICC A117.1-09 requires that the toilet flush controls be located on the open side of the water closet. Please note this requirement on the plans. Response: General note has been added to sheet; refer to updated Drawings.

a. The above comment also applies to Sheet AI421. Response: General note has been added to sheet; refer to updated Drawings.

II. Please show the 5-foot clear turning space within each bathroom, in accordance with 603.2.1 and 304.3.1 of ICC A117.1-09. Response: 5-foot clearance has been added to all toilet room enlarged plans on sheets AI420 & AI421. At locations where the clearance overlaps the door swing, a clear floor space complying with 305.3 has also been shown. Refer to updated Drawings.

III. SHL0915: Please clarify the mounting heights of the proposed shelves in accordance with ICC A117.1-09 Section 603.4. Response: Per Equipment / Accessory Mounting diagram on G005, the shelf will be mounted 48” AFF maximum per 603.4. The depth will also be reduced to 4” deep.

a. The above comment also applies to Sheet AI421. Response: See above.

IV. Please clarify the mounting height of fixture TA18. Please verify this element and its operable parts are located within the accessible reach ranges per ICC A117.1-09 Section 308 and 309. Response: Per Toilet Accessory Mounting Diagram on G005, Specimen Pas Box will be mounted within reach ranges of section 308 and 309.

a. The above comment also applies to Sheet AI421. Response: See above.

V. Provide signage as required by IBC 1111.1 at the public restrooms. Please indicate dimensions of signs and text, mounting height and location of signs, etc., as required to show compliance with Section 703 of ICC A117.1-09. Response: Per Record Documents, code-compliant signage is already provided at existing public restrooms. Refer to D4/G003 for accessible sign requirements. Note has been added to comply with all requirements of Section 703.

a. The above comment also applies to Sheet AI421. Response: Code-compliant signage will be provided at all restrooms. General note has been added; refer to updated Drawings.
B. Details A1, C1, & D1: It appears that fixture WST0121 overlaps the clear floor space of lavatories in Restrooms 5130, 5156, and 5171. This is not permitted by ICC A117.1-09 Section 606.2. Please address. Response: Locations of WST0121 in the listed toilet rooms have been adjusted to avoid conflicts with the lavatory clear floor space. Refer to updated Drawings.

C. Details A1 & B1: It appears SHL0915 overlaps the maneuvering clearance at the toilet room door. This is not permitted by ICC A117.1-09 Section 404.2.3.2. Please address. Response: depth of SHL0915 will be revised to 4”. Refer to updated Drawings. Per 404.2.2, projections into the clear opening width are permitted between 34”-80” if they do not exceed 4 inches.

D. Detail C1: It appears that fixture WST0121 overlaps the clear floor space of the water closet, this is not permitted by ICC A117.1-09 Section 604.3. Please address. Response: Location of WST0121 has been moved

E. Detail C6: Please specify the side wall vertical grab bar per ICC A117.1-09 Section 604.5.1. Response: Side wall vertical grab bar is shown in detail C5 for Toilet 5156.

A9. Sheet AI421: Please address the following:

A. Details A1 & D1: Please address the following:

I. Please show the 5-foot clear turning space within each bathroom, in accordance with 603.2.1 and 304.3.1 of ICC A117.1-09. Response: 5-foot clearance has been added to all toilet room enlarged plans on sheets AI420 & AI421. At locations where the clearance overlaps the door swing, a clear floor space complying with 305.3 has also been shown. Refer to updated Drawings.

II. It appears that fixture WST0121 overlaps the clear floor space of lavatories in Restrooms 5109 and 5124. This is not permitted by ICC A117.1-09 Section 606.2. Please address. Response: Locations of WST0121 in the listed toilet rooms have been adjusted to avoid conflicts with the lavatory clear floor space. Refer to updated Drawings.

B. Detail D5: Please specify the side wall vertical grab bar per ICC A117.1-09 Section 604.5.1. Response: Elevation D5 is the rear wall. Vertical grab bar is shown in elevation D4 for Toilet 5124.

A10. Sheet AI450: Please address the following:

A. Details C1, C3, & C5: Please verify the glazing types T, and DF1 are tempered in accordance with IBC Section 2406.4. Response: DF1 is the privacy film type. Glazing type T is tempered in accordance with IBC, refer to Specification 08 81 04 for glazing types.

I. The above comment also applies to Sheet AI601 for Window/Storefront Type S2, Door Frame Type 7, and Door Types G, N, FG1 and FG2. Response: Glazing types are tempered in accordance with IBC, refer to Specification 08 81 04 for glazing types.

A11. Sheet AI501: Please address the following:

A. Please clarify if any elements of the existing primary structural frame will be affected by the proposed demolition and remodel of this floor. If so, please provide complete details in accordance with IBC Section 704 for how these existing elements that are part of the existing primary structural frame will be protected. Response: No revisions will be made to the existing primary structural frame for the remodel of this floor. Per keynote 21 on AI105.A and AI105.B, existing fireproofing must remain and be protected. General note 17 on Reflected ceiling plans has been clarified to patch and repair as required.
A12. Sheet AI521: Please address the following:

A. Detail A1: Please verify the fire extinguishers will not project more than 4 inches over the walking surface as required by IBC 1003.3.3. This may require recessed fire extinguisher cabinets. **Response: Confirmed – refer to detail B2.**

A13. Sheet AI601: Please address the following:

A. Several doors throughout the door schedule are noted as being 4’-1.25” doors. However, IBC 1010.1.1 limits the size of egress doors to be no more than 48-inches in width. Please address. **Response: These wide doors are the width of the door panel at sliding barn doors entering patient care spaces per Intermountain Design Guidelines. The 48” max limit noted in 1010.1.1 is in reference to swing doors. At each sliding door location, there is also a swing door exiting the room that is less than 48” wide, refer to floor plans.**

B. Door Hardware – Specification 08 71 00 20: Please address the following:

   I. Hardware Set 1: It appears that automatic door openers are proposed to be provided Door 5001. These openers must be compliant with the following per ICC A117.1-09 Section 404.3 as follows:

      a. Theses doors shall comply with ANSI/BHMA A156.10 or A156.19 based on the proposed design of the opener. **Response: Confirmed.**

      b. Please provide complete information on the control switch. This switch shall comply with Section 309 of ICC A117.1-09. Please provide complete information showing how compliance has been achieved per ICC A117.1-09 Section 404.3.5. **Response: Confirmed – refer to updated Drawing EE105B for locations of hand-wave control switches. Assa Abloy Securitron WSS Wave Sense Switch has been specified and will be mounted per Section 309 and 404.3.5.**

      c. Please ensure that the clear floor space provided for the switch is located outside of the swing of the door per ICC A117.1-09 Section 404.3.5. **Response: Confirmed, required clear floor space will be provided – refer to Drawing EE105B for locations.**

   II. Hardware Set 6 indicates a delayed egress function for Door 5008. Please address the following per IBC 1010.1.9.8.1:

      a. Please revise the notes to indicate the delay electronics shall be deactivated by activation of both the fire alarm and sprinklers. **Response: Note has been added to Hardware Set 6.0. Refer to updated Specifications.**

      b. Please verify the delayed egress function can be deactivated at the fire command center or other approved locations. **Response: Keynote has been added to plans to clarify functionality in the fire command center, but this will largely be programming. Refer to updated Drawings.**

      c. Please provide information on the signage to be provided adjacent to this door in accordance with IBC 1010.1.9.8.1 Item 6. **Response: Note has been added to door schedule for this door. Refer to updated Drawings.**

      d. Please verify this system has been listed in accordance with UL 294. **Response: Confirmed, the fire alarm system us in accordance with UL. Note has been added to provide door listed in accordance with UL 294. Refer to updated Drawings and Specifications.**
III. Hardware Set 20: Provide information for the hardware on the sliding door. The sliding door hardware is required to be accessible and operable from both sides of the door in both the open and the closed positions per Section 404.2.6 of ICC A117.1-09. Response: The AD systems Examslide has been specified as the basis of design; refer to specification section 08 32 13. This product will is compliant with Section 404.2.6. Note has been added to door panel type C on AI601 clarifying location of ladder pull; refer to updated Drawings.

IV. Hardware Set 21: Please provide information on how the access control and power provided to this hardware set will allow the free egress from the spaces this hardware set will be provided to in accordance with IBC 1010.1.9. Response: Refer to specifications 08 32 13 for requirements of Hardware Set 21. Door hardware at card reader locations will be revised to an electric strike to allow one operation for egress through these sliding doors per IBC 1010.1.9.6. Refer to updated Specification 08 32 13.

V. Please provide a note on the plans that the contractor will verify the existing doors and existing hardware comply with the requirements of IBC 1010.1.9 or update the hardware as required. Response: General Note 7 has been added to Sheet AI601; refer to updated Drawings.

C. Provide a note or otherwise indicate that door hardware shall meet the requirements of IBC 1010.1.9.1. Hardware shall not require pinching, tight grasping, or twisting of the wrist in order to operate. Response: General Note 6 has been added to sheet AI601; refer to updated Drawings.

D. Include in the door elevation details the mounting heights for the door hardware in accordance with IBC 1010.1.9.2. All locks, door handles, pulls, latches, or other operating hardware is required to be located between 36 and 48 inches above finished floor. Response: General note has been added to the door type elevation for all operating hardware to be located between 34 and 48 inches per IBC 1010.1.9.2 (there appears to be an error in this comment that indicates 36 inches). Refer to updated Drawings.

A14. IEBC 305.7 requires that when an area of primary function is altered that it must be provided with an accessible route. Please address the following:

A. Sheet G150: Please add a note to the plans indicating the contractor and inspector will field verify the existing accessible route between the existing accessible parking and building entrance does not exceed a 5% running slope and 2% cross slope as required by IBC 1104.1 and ICC A117.1-09 Section 403.3. If the existing accessible route is not compliant, the contractor will update as required. Response: It has been confirmed in the Record Documents for the construction of the existing building, that an accessible route is provided between the accessible parking and the building entrance. Owner and/or Architect will be conducting an accessibility survey to confirm compliance and will notify contractor of any improvements required. Note will be added to G150 that inspector shall field verify that the existing accessible route is compliant.

B. Elevators: Please add a note to the plans indicating the contractor and inspector will field verify the existing elevators comply with Section 407 of ICC A117.1-09. If the existing elevators are not complaint, the contractor will update them as required. Response: It has been confirmed in the Record Documents that the elevators to access the area of work are accessible. Owner and/or Architect will be conducting an accessibility survey to confirm compliance and will notify contractor of any improvements required. A note will be added to G105 indicating that the inspector shall field verify that the existing elevators comply.

I. Provide details so that the contractor may verify that the existing elevator complies with Section 407 of ICC A117.1-09. This includes: Call Controls, Signals, Hoistway signage,
Elevator sizes, Elevator buttons (in cab), Car position indicators, and Signage at elevator. **Response:** The elevators are not included in the scope of work, but have been confirmed per the note above. Owner and/or Architect will be conducting an accessibility survey to confirm compliance and will notify contractor of any improvements required.

C. Because existing restrooms will be serving the proposed space, please to the plans indicating the contractor and inspector will field verify the existing restrooms are compliant with the provisions of ICC A117.1-09 Chapter 6. If the existing restrooms are not complaint, the contractor will update them as required. **Response:** It has been confirmed in the Record Documents that the existing restrooms comply with provisions of ICC A117.1-09 Chapter 6. Owner and/or Architect will be conducting an accessibility survey to confirm compliance and will notify contractor of any improvements required. A note will be added to G105 indicating that the inspector shall field verify that the existing restrooms comply.

D. Where not all features are accessible (such as entrances, bathrooms, elevators, etc.) provide directional signage per IBC 1111.2 at the non-accessible feature indicating the location of the accessible feature provided. **Response:** All features are accessible. If any existing features are determined to be non-accessible, directional signage will be provided per IBC.

E. If any of the above items do not comply with ICC A117.1-09, and will not be upgraded, please provide a cost analysis showing that the cost to do so will exceed 20% of the construction cost of alterations to the area containing the primary function per Exception 1 to IEBC 305.7. **Response:** As noted in Record Documents, all existing items above are in compliance. Owner and/or Architect will be conducting an accessibility survey to confirm compliance.

**MECHANICAL REVIEW COMMENTS:**

M1. Sheet ME001: Please address the following:

   A. Please include general notes indicating compliance with NFPA 99. **Response:** A “compliance” General Note has been added to ME001 indicating compliance with NFPA 99.

M2. Sheet M105: Please address the following:

   A. It appears the above ceiling area is to be used as a return air plenum. Please specify on the plans all material or items within the plenum shall be noncombustible or must be listed and labeled as having a flame spread index of not more than 25 and a smoke developed index of not more than 50 when tested per ASTM E84 or UL723, in accordance with IMC 602.2.1. **Response:** A general note has been added to M105 indicating materials within the plenum shall be noncombustible as described.

M3. Sheet MH501: Please address the following:

   A. Please provide clarification regarding seismic bracing for the VAV boxes. IBC 1613.1, and Chapter 13 of ASCE 7-16. It’s unclear which provisions apply to the VAV boxes. **Response:** As noted on sheet M501, please refer to specifications for required seismic design and application. Specification 233600 3.1.F: "Comply with SEI/ASCE 7 and with requirements for seismic-restraint devices in Section 230548 "Vibration and Seismic Controls for HVAC."
PLUMBING REVIEW COMMENTS:

P1. Sheet MG105: Please address the following:
   A. The bridge shown connecting the two portions of the building is likely to have some seismic joint element on one side or the other. The proposed oxygen line needs to have a seismic expansion joint or other provisions to preserve the integrity of the pipe. IPC 308.8. Response: An expansion joint has been added. Refer to updated Drawings.

P2. Sheet P105: Please address the following:
   A. The proposed hot water lines for public fixtures in restrooms appears to exceed the allowable lengths of the 2018 IECC. Please see energy comments below regarding limitations. Response: Plumbing plan has been revised to extend the domestic hot water loop to lavatories in public restrooms per 2018 IECC requirements. Refer to updated Drawings.

P3. Sheet PP601: Please address the following:
   A. Please show water hammer arrestors at all quick closing valves, flushometers, ice machines, dishwashers and washing machines per IPC 604.9. Response: Water hammer arrestors have been added to domestic cold water piping serving toilet rooms. Refer to updated Drawings.

ELECTRICAL REVIEW COMMENTS:

E1. Sheets ED105A & ED105B: Please address the following:
   A. These sheets appear to be blank, it is unclear what existing electrical circuitry, devices, lighting etc. is set for demolition. Please clarify. Response: Demolition scope includes removal of all equipment in the area of work as this is a complete demolition except unrelated item. Refer to demolition notes on updated drawings.

E2. Sheet EP601: Please address the following:
   A. Show the fault current rating of each switchgear and each new panelboard. Response: Fault current ratings have been added to new panels in updated Drawings; existing panels are existing and modifications to system do not impact available fault current.
   B. Specify on the plans the short circuit current ratings of all overcurrent protection devices or add a note on the plans indicating all overcurrent protection devices will have the same fault current rating as the rating of the panel or switchgear they are located within. Response: General note stating that all overcurrent protection devices will have the same fault current rating as the rating of the panel or switchgear they are located within; added to plans in updated Drawings.
   C. If panels 5LE and 5LF are new, please provide a one-line diagram showing where these panels are fed from, and what size conductors are feeding them. Response: One line diagrams added in updated Drawings.

E3. Sheet ELC105A: Please address the following:
   A. The room names are omitted from this sheet. Please ensure that all electrical rooms, and public restrooms over 300 square feet are provided with emergency lighting as per IBC 1008.3.3. Response: Room names added to plans in updated Drawings. All bathrooms are provided with emergency lighting.
E4. Sheet ET105A & ET105B: Please address the following:

A. Please clarify how the proposed cable/data tray will be grounded and bonded. 
   Response: General note added to ET plansto address grounding requirements. Refer to updated Drawings.

ENERGY REVIEW COMMENTS:

N1. Per IECC 404.5.1, the maximum distance of pipe from the hot water source to the lavatory cannot exceed 6 feet maximum for ¼” lines, 2 feet for ½” lines and only 6” for ¾” lines. It appears either instantaneous water heaters, shorter lengths or other design alternatives are necessary. Please Note: This applies to public lavatories only, see table for non-public fixtures. 
   Response: Plumbing plan has been revised to extend the domestic hot water loop to lavatories in public restrooms per 2018 IECC requirements. Refer to updated Drawings.

If you have any questions regarding the above comments, please contact Alexa Nielsen at alexan@wc-3.com or by phone at (801) 547-8133.

[END]
### A/E SUPPLEMENTAL INSTRUCTIONS

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<th>Address</th>
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<td>Contractor</td>
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**Reason For Change (Required):**
- [ ] A/E Error
- [ ] A/E Omission
- [ ] A/E Request
- [ ] GC Request
- [ ] Owner/FD&C Request
- [ ] Functional Request
- [ ] Unknown Condition

The Work shall be executed in accordance with the following supplemental instructions, which interpret the Contract Documents or order minor changes in the Work without change in Construction Costs, Contract Sum and/or Contract Time.

If the Contractor believes that a change in Construction Costs, Contract Sum, and/or Contract Time is warranted, the Contractor shall submit written notice in the form of a Proposed Change Order (PCO) within fourteen (14) days substantiating such claim to the A/E. The claim shall be made in accordance with the provisions of the Contract Documents. The Owner’s authorization is required prior to proceeding with any Work which will incur additional cost and/or time.

#### DETAILED DESCRIPTION:

Text

#### ATTACHMENTS:

Text

Approved by FD&C¹:

(Signature) (Date)

---

¹ For major capital projects, FD&C Project Manager to sign.
For local facility managed projects, local facility Project Manager to sign.
# CONSTRUCTION CHANGE DIRECTIVE

**Project Name:**

**Address**

**A/E:**

**Architect**

**Bid Package:**

**1.0X**

**Date:**

**Date Issued**

**Owner:**

**IHC Health Services, Inc.**

**CCD Page Count:**

**XX**

**Intermountain Project #:**

**Project ID #**

**CCD Prepared By:**

**Name**

**FD&C PM:**

**PM Name**

**Contractor:**

**Contractor**

**CCD Subject:**

**Subject**

**Reason For Change (Required):**

- [ ] A/E Error
- [ ] A/E Omission
- [ ] A/E Request
- [ ] GC Request
- [ ] Owner/FD&C Request
- [ ] Functional Request
- [ ] Unknown Condition

**ESTIMATED CHANGE IN CONSTRUCTION COSTS, CONTRACT SUM, OR CONTRACT TIME:**

$ 

In order to expedite the work and avoid or minimize delays in the work which may affect the contract sum and/or contract time, the Contract Documents are hereby amended as described below. Proceed with this work promptly. Submit final costs for work involved and change in Contract Time (if any as a Proposed Change Order), for inclusion in a subsequent Change Order, per the General Conditions.

All work shall be in accordance with the terms, stipulations and conditions of the original Contract Documents.

**DESCRIBE BRIEFLY ANY PROPOSED CHANGES:**

Text

**ATTACHMENTS:**

Text
Approved by FD&C PM¹:

(Signature)  (Date)

Approved by FD&C Exec. Director²:

(Signature)  (Date)

¹ For major capital projects, FD&C Project Manager to sign. For local facility managed projects, local facility Project Manager to sign.

² For major capital projects, FD&C Design & Construction Exec. Director to sign when the charge exceeds $200,000 as outlined in "Construction Change Order Procedure". For local facility managed projects, System Construction Director to sign when the charge exceeds $25,000 as outlined in "Approval Authority Capital Expenditures Policy".
### CHANGE ORDER

**CO # 001**

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This Change Order is not valid until signed by the Owner, A/E and Contractor.

**CO Description**

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**CO Details:**

<p>| The Original Contract Sum was | $ |
| The net change by previously authorized Change Orders was | $ |
| The Contract Sum prior to this Change Order was | $ |
| The Contract Sum will be increased (decreased) by this Change Order | $ |
| The new Contract Sum including this Change Order, will be | $ |
| The Contract Time will be increased (decreased) by | Enter Calendar Days or 0 |
| The date of Substantial Completion as of this Change Order therefore is | Enter Date |</p>
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1 For major capital projects, FD&C Design & Construction Exec. Director to sign. For local facility managed projects, System Construction Director to sign.

2 For major capital projects, FD&C Project Manager to sign. For local facility managed projects, System Construction Director to sign.
**FUNCTIONAL CHANGE REQUEST**

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<td>PM Name</td>
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Request Description:

Please submit a fully itemized list of Construction Costs, with supporting documentation, for any changes in the Construction Costs, Contract Sum, and/or Contract Time incidental to the proposed modifications to the Contract Documents described herein. Submit proposal within seven days, or notify the A/E in writing of the date on which you anticipate submitting your proposal.

This form must be signed & approved by the FD&C PM prior to Contractor proceeding with pricing.

*THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE OR A NOTICE TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.*

**REASON FOR REQUEST:**

Text

**BUSINESS CASE JUSTIFICATION:**

Text

**Requester:**

(Signature) (Printed Name and Title) (Date)

**Operations Management Approval:**

(Signature) (Printed Name and Title) (Date)

**Approved by FD&C PM:**

(Signature) (Date)

---

1 For major capital projects, FD&C Project Manager to sign. For local facility managed projects, local facility Project Manager to sign.
**Proposed Change Order**

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**Bid Package:** 1.0X  
**Owner:** IHC Health Services, Inc.  
**Project #:** Project ID #  
**FD&C PM:** PM Name  
**A/E:** Architect  

**PCO Issue Date:** Date Issued  
**PCO Page Count:** XX  
**PCO Prepared By:** Name

*Once this document is executed the Contractor is authorized to proceed with the work described below and to include this PCO in a Change Order for A/E and Owner approval.*

**PCO Description:** Description  
**Reference:** Reference ASI, RFI, PR, CCD change document this PCO is in response to.

**Reason For Change (Required):**
- [ ] A/E Error
- [ ] A/E Omission
- [ ] A/E Request
- [ ] GC Request
- [ ] Owner/FD&C Request
- [ ] Functional Request
- [ ] Unknown Condition
- [ ] **Facility**

*If A/E Error or A/E Omission is checked, the Contractor is to provide pricing delta (bid cost vs. C.O. cost) to determine A/E responsibility.*

**If Facility is checked, the Facility and FD&C PM are to determine the Facility’s cost responsibility, including design fees and the Facility representative is to initial the PCO or provide email acknowledgement of financial commitment and attach to PCO.*

**PCO Details:**

*If A/E is responsible for $___________________. Agreed to if PCO is signed.*

**If Facility is responsible for $___________________. Agreed to if PCO is signed.**

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**Contractor:**
- Contractor Firm
- Contractor Rep. Name - Title

**Architect:**
- Architect Firm
- Architect Rep. Name - Title

**Intermountain Healthcare:**
- IHC Health Services, Inc.
- Owners’ Rep. – PM Name

**Signatures:**
- Signature  
- Date
- Signature  
- Date
- PM Signature
- Date
- FD&C Exec. Director Signature
- Date

1 For major capital projects, FD&C Project Manager to sign.*
For local facility managed projects, local facility Project Manager to sign.*

2 For major capital projects, FD&C Design & Construction Exec. Director to sign when the charge exceeds $200,000 as outlined in "Construction Change Order Procedure".
For local facility managed projects, System Construction Director to sign when the charge exceeds $25,000 as outlined in "Approval Authority Capital Expenditures".

* PM signatures are required for all PCO’s prior to work commencing.
# PERSONNEL OVERTIME APPROVAL FORM

**Project Name:**

<table>
<thead>
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<th>Address</th>
<th>City, State, Zip</th>
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</thead>
</table>

**Owner:** IHC Health Services, Inc.

**Intermountain Project #:**

**FD&C PM:**

**Contractor:**

**Employee or position:**

**Job Title:**

**Salaried Employee:** [ ] (Check box if yes)

**Hourly Rate:**

**Invoice Period:**

Contractor requests Owner's approval of employee overtime for the Project as originally specified in the Contract. The proposed overtime and the reasons for the request are specified below. The proposed overtime will be deemed approved by Owner at the time this request form is duly executed on behalf of Owner in the space provided below.

## OVERTIME JUSTIFICATION:

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<td>FD&amp;C Project Manager</td>
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</table>

**Signature**  
**Date**

**Signature**  
**Date**
PERSONNEL STAFFING CHANGE REQUEST FORM

A/E or Contractor (as applicable) requests Owner’s approval of certain changes to the Personnel Staffing Plan for the Project as originally specified in A/E or Contractor’s proposal attached to the Contract. The proposed staffing changes and the reasons for the request are specified below. The proposed staffing changes will be deemed approved by Owner at the time this request form is duly executed on behalf of Owner in the space provided below.

REASON FOR CHANGE:
Include with this request: (1) The staffing plan from original project proposal encompassing complete project team. (2) An updated staffing plan with noted additions/deletions. (3) A current staff resume of proposed staff indicating relevant health care related experience along with the time commitment on the project, staff labor rates and change justification.

A/E or Contractor:
A/E or Contractor Firm
A/E or Contractor Rep. Name - Title

Owner:
IHC Health Services, Inc.
Clay Ashdown

Signature
Date

VP, Financial Strategy, Growth and Development
Date

Exec. Director, Design & Construction / System Construction Director
Date

FD&C Project Manager
Date
PROPOSAL REQUEST

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Reason For Change (Required):

- [ ] A/E Error
- [ ] A/E Omission
- [ ] A/E Request
- [ ] GC Request
- [ ] Owner/FD&C Request
- [ ] Functional Request
- [ ] Unknown Condition

Please submit a fully itemized list of Construction Costs, with supporting documentation, for any changes in the Construction Costs, Contract Sum, and/or Contract Time incidental to the proposed modifications to the Contract Documents described herein. Submit proposal within seven days, or notify the A/E in writing of the date on which you anticipate submitting your proposal.

THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE OR A NOTICE TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.

DESCRIPTION:

Text

ATTACHMENTS:

Text

Requested by:

(Signature) (Printed Name and Title) (Date)

Approved by FD&C PM¹:

(Signature) (Date)

¹ For major capital projects, FD&C Project Manager to sign.
For local facility managed projects, local facility Project Manager to sign.
### REQUEST FOR INFORMATION

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| Contractor Attestation (Required checkbox): | The undersigned Contractor has reviewed the Contract Documents and is unable to locate this requested information within the Contract Documents. This RFI requests information, direction, or clarification for this specific item. |

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SECTION 08 32 13
MANUAL SLIDING DOORS - INTERIOR

PART 1 - GENERAL

1.1 SUMMARY
A. Furnish labor, materials, tools, equipment, and services for Manual Sliding Doors - Interior, as indicated, in accordance with provisions of Contract Documents.
B. Completely coordinate with work of other trades.

1.2 QUALITY ASSURANCE
A. Manufacturer Qualifications:
   1. Firm experienced in manufacturing sound control door assemblies similar to those indicated for the Project and with a record of successful in-service performance.
   2. Provide doors, frames, gasketing, thresholds, hinges when integral with design, and other appurtenances required for sound control.
   3. Single manufacturer shall provide sound control door assemblies.
B. Sound Control Door Assembly Standards:
   1. Tested by independent acoustical agency accredited by the National Voluntary Laboratory Association Program of NIST.
   2. Standards identical to assemblies whose STC ratings are determined according to ASTM E90 and ASTM E413.
   3. STC rating: 40.
C. Installer Qualifications: Employed or trained by product manufacturer, with a minimum five (5) years experience installing and maintenance of manual sliding doors and equipment.
E. American National Standards Institute (ANSI):
   1. ANSI Z97.1 Standards for Safety Glazing Material Used in Buildings
   2. ANSI A117.1 Accessible and Usable Buildings and Facilities
F. ASTM International (ASTM):
H. National Association of Architectural Metal Manufacturers (NAMM): Metal Finishes Manual for Architectural Metal Products
I. LEED Requirements:
   1. Refer to Section 01 81 13, LEED v2009 Requirements, for additional performance requirements that may apply to products specified in this section.

1.3 SUBMITTALS
A. Shop Drawings: Include elevations, sections and details, indicating dimensions, materials, and fabrication of doors, frames, sidelites, hardware, finish, options and accessories.
B. Project Data: Including material descriptions, fabrication, operational descriptions and finishes.
C. Samples: Aluminum color range samples.
D. Contract Closeout Information:
   1. Manufacturers operating and maintenance manuals for each item comprising complete door
      opening installation.
      a. Include name, address, and contact information of manufacturer providing the
         hardware, spare parts list, and nearest service representative.
      b. Deliver upon completion of installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manual Sliding Doors – Interior:
   1. Interior Aluminum-Framed Top-Hung Sliding Doors
   2. Basis of Design: Model – Aurora (AD Systems) High Performance Sliding Door System by
      Aurora Doors or approved equal.
      a. Optional:
         1) Assa Abloy RITE SLIDE Sliding Door System
      b. Specified Wall Thickness: 1/8 IN.
      c. Frame Profiles: Extruded aluminum
      d. Finish: Finish meeting AAMA 2605, color selected.
   3. Doors: Factory machined for hardware including pilot and function holes.
      a. Flush wood door to be constructed with SCLC cores. Doors to be 5 ply construction,
         assembled with hot press methods and matching edges applied before faces.
         1) Exposed crossbands not allowed.
         2) Veneer species finish: Finish to match wood doors specified in Section 08 14 16-
            FLUSH WOOD DOORS.
         3) Integral corner block mechanically secured.
         4) Concealed adjustable sweep gasket in bottom rail.
         5) STC 35 and Acoustical Door Bottom.

B. Configuration
   1. Single Slide surface mounted door unit with no sidelites.
   2. Surface mounted header installed on face of wall.
   4. Unit Dimensions:
      a. Refer to Door Types on AI601
      b. 7 FT – 2 ½ IN high, unless noted otherwise.
      c. Minimum clear opening of 3’-6” at all Exam, Echo/EKG/PV, and Stress Test Rooms.
      d. Refer to door schedule for door width at all other locations.

C. Components:
   3. Valances: Extruded aluminum with integral end caps
   4. Top Rollers: tandem nylon roller sized to match door weight

D. Door Hardware:
   1. Card Reader locations: AD Systems Hardware Group ELEC3-AD-11 or equal (self-latching
      single egress, electric strike, 16” ladder pull & rectangular escutcheon with tubular lever),
      stainless steel edge guard, smoke seal, and soft/self close action. Coordinate additional
      components with Door Hardware specified under Section 08 71 00.
   2. Passage Lock locations:
      a. Surface-mounted pull – Passage 16” Ladder Pull.
      b. 12 IN x 3/4 IN
      d. Comply with quality and standards specified in Section 08 71 00.
      e. Hager H3L.
3. Soft-closer: soft and self-closing mechanism at one or both sides of door leaf.

E. Supports: Provide structural components required to support and brace units.

**PART 3 - EXECUTION**

**3.1 INSPECTION**

A. Examine door, frame and opening for compliance with requirements of installation tolerances, wall and floor construction.

B. Perform corrective work as required to allow successful installation.

C. Installation constitutes acceptance of responsibility for performance.

**3.2 INSTALLATION**

A. Install doors in accordance with manufacturer’s instructions and approved shop drawings.

B. Install and adjust sound seals that are not permanently factory-installed, in accordance with the manufacturer's written instructions.

C. Install and adjust hardware according to hardware manufacturer's written instructions.

**3.3 FIELD QUALITY CONTROL**

A. Engage a qualified independent testing agency to perform sound control field testing.

B. Independent testing agency services shall include the following:
   1. Field tests conducted according to ASTM-E336 with results calculated according to ASTM-E413 to confirm that operating field STC values are within 5 dB of laboratory STC values.
   2. Test results reported promptly in writing by testing agency to Owner, Contractor and Architect.

C. Repair or replace components of sound control doors where test results indicate STC rating does not meet requirements.
   1. Testing agency repeat field test at Contractor's expense, and Contractor correct defects until tests show satisfactory results.

**3.4 ADJUSTMENT AND CLEANING**

A. Adjust doors and hardware for smooth, safe operation.

B. Remove excess sealants, compounds, dirt and other substances.

C. Clean surfaces soiled by door installation.

D. Remove and replace defective work, including but not limited to the following:
   1. Damaged or ineffective seals.
   2. Doors or frames that are warped, bowed or otherwise unacceptable.

END OF SECTION
SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY
A. This Section includes commercial door hardware for the following:
   1. Swinging doors.
   2. Sliding doors.
B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Automatic operators.
C. Related Sections:
   1. Division 08 Section “Hollow Metal Doors and Frames”.
   2. Division 08 Section “Flush Wood Doors”.
   3. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
   4. Division 08 Section “All-Glass Entrances”.
D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
   8. State Building Codes, Local Amendments.
E. Standards: All hardware specified herein shall comply with the following industry standards:
   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS
A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI’s "Sequence and Format for the Hardware Schedule.”
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals
that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
   1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
      a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
      b. Complete (risers, point-to-point) access control system block wiring diagrams.
      c. Wiring instructions for each electronic component scheduled herein.
   2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:
   1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that
indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Building Information Modeling (BIM) Qualifications: BIM software tools and processes are used to produce and support data integration of product and technical information used in specifications, submittals, project reviews, decision support, and quality assurance during all phases of Project design, construction, and facility management. Door and hardware schedules and the associated product data parameters are to be derived, updated, and fully integrated with the coordinated BIM.

1. Door Hardware BIM Software Tool: Openings Studio™ is the designated BIM software suite to be used in a coordinated effort with architects, contractors and trades to integrate Project product data and information into the coordinated Record BIMs and associated applications.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.

2. Plans for existing and future key system expansion.

3. Requirements for key control storage and software.

4. Installation of permanent keys, cylinder cores and software.

5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.

3. Review sequence of operation narratives for each unique access controlled opening.

4. Review and finalize construction schedule and verify availability of materials.

5. Review the required inspecting, testing, commissioning, and demonstration procedures

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.
1.5 DELIVERY, STORAGE, AND HANDLING
   A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
   B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
   C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION
   A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
   B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
   C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.
   D. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.7 WARRANTY
   A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
   B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
      1. Structural failures including excessive deflection, cracking, or breakage.
      2. Faulty operation of the hardware.
      3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      4. Electrical component defects and failures within the systems operation.
   C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
   D. Special Warranty Periods:
      1. Ten years for mortise locks and latches.
      2. Five years for exit hardware.
      3. Twenty five years for manual surface door closer bodies.
      4. Two years for electromechanical door hardware.
1.8 MAINTENANCE SERVICE
A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS
2.1 SCHEDULED DOOR HARDWARE
A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
   1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES
A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
   4. Hinge Options: Comply with the following:
      a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
   5. Manufacturers:
      a. Hager Companies (HA) - CB Series.
      b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - TA Series.
B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge, with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to
template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. **Manufacturers:**
   a. Hager Companies (HA).
   b. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

C. **Continuous Geared Double-acting Hinges. ANSI/BHMA A156.26 Grade 1-600 Certified**
continuous geared hinges. Hinges shall be non-handed and allow the door to swing up to 100 degrees in either direction. Where required provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions as specified. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. **Manufacturers:**
   b. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE) – DSH Series.

D. **Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 certified pin and barrel**
continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed teflon coated stainless pin, and twin self-lubricated nylon bearings at each knuckle separation.
Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. **Manufacturers:**
   b. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 **POWER TRANSFER DEVICES**

A. **Electrified Quick Connect Transfer Hinges:** Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. **Manufacturers:**
   a. Hager Companies (HA) - ETW-QC (# wires) Option.
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - QC (# wires) Option.

B. **Concealed Quick Connect Electric Power Transfers:** Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. **Manufacturers:**
   a. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE) – EL-CEPT Series.
   b. Securitron (SU) - EL-CEPT Series.

C. **Electric Door Wire Harnesses:** Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:
   a. Hager Companies (HA) - Quick Connect.
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – QC-C Series.

2.4 DOOR OPERATING TRIM
   A. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
   1. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
   2. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
   3. Manufacturers:
      a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
      b. Trimco (TC).

2.5 CYLINDERS AND KEYING
   A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
   B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
   C. Cylinders: Original manufacturer cylinders complying with the following:
      1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
      2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
      3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
      4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
   D. High Security Cylinders: ANSI/BHMA A156.5, Grade 1 High security cylinder conforming to UL437, including both pick and drill resistance. Pick resistance incorporates two or more independent locking mechanisms including a pin tumbler device with six top pin chambers, mushroom-shaped driver pins, and coded sidebar locking mechanism operated independently from the six top pin tumbler device. Drill resistance incorporates cylinder housing with fixed case-hardened inserts protecting the pin tumbler shear line, cylinder plugs with case-hardened inserts protecting both the pin tumbler shear line and the side bar, mushroom-shaped stainless steel driver pins, and stainless steel sidepins. Cylinders to be factory keyed.
      1. Manufacturers:
         a. ASSA (AA) – V10 Series.
   E. Keying System: Each type of lock and cylinders to be factory keyed.
      1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
      2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
      3. Existing System: Field verify and key locks to match Owner's existing system.
   F. Key Quantity: Provide the following minimum number of keys:
      1. Change Keys per Cylinder: Two (2)
      2. Master Keys (per Master Key Level/Group): Five (5).

G. Construction Keying: Provide construction master keyed cylinders.

### 2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
   1. Provide status indicators with highly reflective color and wording for “locked/unlocked” or “vacant/occupied” with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1” x 0.6” with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.
   
2. Manufacturers:
   a. Sargent Manufacturing (SA) – 8200 Series.

### 2.7 ELECTROMECHANICAL LOCKING DEVICES

A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below.
   1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, deadbolt monitoring, and request-to-exit signaling. Support end-of-line resistors contained within the lock case. Unless otherwise indicated, provide electrified locksets standard as fail secure.
   2. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
   3. High Security Monitoring: Provide lock bodies which have built-in request to exit monitoring and are provided with accompanying door position switches. Provide a resistor configuration which is compatible with the access control system.
   4. Manufacturers:
   a. Sargent Manufacturing (SA) - 8200 Series.

### 2.8 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer’s standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer’s special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
   4. Dustproof Strikes: BHMA A156.16.

### 2.9 ELECTROMAGNETIC LOCKING DEVICES

A. Surface Electromagnetic Locks (Heavy Duty): Electromagnetic locks to be surface mounted type conforming to ANSI A156.23, Grade 1 with minimum holding force strength of 1,200 pounds. Locks to be capable of either 12 or 24 voltage and be UL listed for use on fire rated door.
assemblies. Electronics are to be fully sealed against tampering and allow exterior weatherproof applications. As indicated in Hardware Sets, provide specified mounting brackets and housings. Power supply to be by the same manufacturer as the lock with combined products having a lifetime replacement warranty.

1. Manufacturers:

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.

6. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
   b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.


11. Rail Sizing: Provide exit device rails factory sized for proper door width application.

12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:
   a. Sargent Manufacturing (SA) - 80 Series.

2.11 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers
to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:
   a. Sargent Manufacturing (SA) - 351 Series.
   b. Norton Door Controls (NO) - 7500 Series.

1.1 ELECTROMECANICAL DOOR OPERATORS

C. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

D. Standard: Certified ANSI/BHMA A156.19.

E. Performance Requirements:

1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.

2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.

F. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.

G. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19.

H. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.
I. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.

J. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.

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

2.12 ARCHITECTURAL TRIM

A. Door Protective Trim
   1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2” less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1” less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
   3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
   4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
      a. Stainless Steel: 300 grade, 050-inch thick.
   5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
   6. Manufacturers:
      a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
      b. Trimco (TC).

2.13 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
   1. Manufacturers:
      a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
      b. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
   1. Manufacturers:
      a. Rixson Door Controls (RF).
      b. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and
provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
   1. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
   2. Reese Enterprises, Inc. (RE).

1.2 ELECTRONIC ACCESSORIES

G. Push-Button Switches: Industrial grade momentary or alternate contact, back-lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi-color illumination suitable for either flush or surface mounting.
1. Manufacturers:
   a. Alarm Controls (AK) - TS Series.
   b. Securitron (SU) - PB Series.

H. Touchless Switches: FCC certified microwave sensing switch used for REX or activation of various access control devices in place of a traditional wired switch. Unit to have an adjustable sensing zone from 4” to 24”. At exterior locations furnish foam gaskets and weather covers. Provide single gang or double gang unit as specified in the hardware sets
1. Manufacturers:
   a. Norton Door Controls (NO) - 700 Series.
   b. Securitron (SU) - WSS Series.

I. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.
1. Manufacturers:
   a. Alarm Controls (AK) - SREX Series.
   b. Securitron (SU) - XMS Series.

J. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1” diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
1. Manufacturers:
   a. Security Door Controls (SD) - DPS Series.
b. Securitron (SU) - DPS Series.

K. Switching Power Supplies: Provide switching power supplies that are dual voltage, UL listed, supervised units. Units shall be field selectable with a dedicated battery charging circuit that provide 4 Amp at 12VDC or 24VDC continuous, with up to 16 independently controlled power limited outputs. Units shall tolerate brownout or overvoltage input ± 15% of nominal voltage and have thermal shutdown protection with auto restart. Circuit breaker shall protect against overcurrent and reverse battery faults and units shall be available with a single relay fire trigger or individually triggered relayed outputs. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw plus 50% for the specified electrified hardware and access control equipment.
1. Manufacturers:
   a. Securitron (SU) - AQ Series.

L. Energy Efficient Switching Power Supplies: Provide UL listed or recognized filtered and regulated power supplies. Provide single voltage units as shown in the hardware sets. Units must have one access control input and one fire alarm input. Standby power consumption of unit must be less than 10mW at 120VAC. Provide integral battery backup as standard for all units. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
1. Manufacturers:
   a. Securitron (SU) – EPS Series.

2.15 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.16 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer’s standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch-Out Report): Reference Division 01 Section "Closeout Procedures". Final inspect installed door hardware and state in report whether work complies with or deviates from specification requirements, including whether door hardware is properly installed, operating and adjusted.

B. Fire Door Assembly Inspection: Reference Division 01 Sections "Closeout Procedures" and "Cash Allowances" for testing and inspection allowances, including cost of engaging testing agencies, performing on-site inspections, and required documentation reporting.
   1. Allowance to perform the inspection and provide report documentation for an initial Fire Door Assembly Inspection upon completion of final hardware installation. A qualified fire door assembly (FDAI) inspector to certify swinging fire door openings are installed in accordance and NFPA 80 Standard for Fire Doors and Other Opening Protectives paragraph 5.2.4, regulatory compliance agencies, and local Authorities Having Jurisdiction (AHJ).

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner’s maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate selection for the material and application.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer’s Abbreviations:

C.
1. GS - ASSA ABLOY Glass Solutions
2. MK - McKinney
3. MR - Markar
4. PE - Pemko
5. RF - Rixson
6. SU - Securitron
7. SA - SARGENT
8. AA - ASSA High Security Locks
9. HS - HES
10. BM - Besam
11. RO - Rockwood
12. OT - Other

Hardware Sets

**Set: 1.0**
Doors: 5001

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Top Door Rail</td>
<td>As project requires</td>
<td>GS</td>
</tr>
<tr>
<td>2 Bottom Door Rail</td>
<td>As project requires</td>
<td>GS</td>
</tr>
<tr>
<td>2 Pivot Set</td>
<td>370</td>
<td>RF</td>
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<tr>
<td>1 Glass Door Exit Device</td>
<td>PDU8000-1 Code 06 LD</td>
<td>US32D</td>
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<tr>
<td>1 Glass Door Exit Device</td>
<td>PDU8000-1 Code 04 LD</td>
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<tr>
<td>1 Cylinder (mortise)</td>
<td>*6551 x cam</td>
<td>AA</td>
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<td>1 Glass Door Electric Strike (dual)</td>
<td>ESK-DBL-XXD</td>
<td>US32D</td>
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<tr>
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<tr>
<td>1 Continuous Hinge</td>
<td>CFMXXSLF-HD1</td>
<td>PE</td>
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<tr>
<td>1 Office Lock</td>
<td>LB LC 8205 LNL</td>
<td>US26D</td>
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<tr>
<td>1 Cylinder (mortise)</td>
<td>*6551 x cam</td>
<td>626</td>
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<tr>
<td>1 Door Stop</td>
<td>400/403/441H (as required)</td>
<td>US26D</td>
</tr>
<tr>
<td>1 Perimeter Seals</td>
<td>By door manufacturer</td>
<td>OT</td>
</tr>
<tr>
<td>1 Door Bottom</td>
<td>STC411APK</td>
<td>PE</td>
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</table>

| Set: 3.0 | Doors: 5175 |
|--------------------------------------------------|
| 1 Continuous Hinge | CFMXXSLF-HD1 | PE |
| 1 Privacy Lock | LB V21 8266 LNL | US26D | SA |
| 1 Door Stop | 400/403/441H (as required) | US26D | RO |
| 1 Perimeter Seals | By door manufacturer | OT |
| 1 Door Bottom | STC411APK | PE |

| Set: 4.0 | Doors: 5182, 5184, 5186 |
|--------------------------------------------------|
| 1 Continuous Hinge | CFMXXSLF-HD1 | PE |
| 1 Passage Set | 8215 LNL | US26D | SA |
| 1 Door Stop | 400/403/441H (as required) | US26D | RO |
| 1 Perimeter Seals | By door manufacturer | OT |
| 1 Door Bottom | STC411APK | PE |

| Set: 5.0 | Doors: 5103, 5177 |
|--------------------------------------------------|
| 1 Continuous Hinge | CFMXXSLF-HD1 | PE |
| 1 Passage Set | 8215 LNL | US26D | SA |
| 1 Concealed Overhead Stop | 6-X36 | 630 | RF |
| 1 Perimeter Seals | By door manufacturer | OT |
| 1 Door Bottom | STC411APK | PE |

| Set: 6.0 | Doors: 5008 |
|--------------------------------------------------|

Notes:
Doors unlocked during business hours.
Entry by valid credential after business hours releasing the electric strikes; mechanical key override.
Free egress at all times by glass door exit device
Coordination required for card access and automatic operator use.
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model/Brand</th>
<th>Finish/Type</th>
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<tbody>
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<td>Continuous Hinge</td>
<td>FM300 CTP</td>
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<td>1</td>
<td>Delayed Egress Rim Exit Device</td>
<td>LC 59 8815 ETL</td>
<td>US32D SA</td>
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<td>1</td>
<td>Cylinder (mortise)</td>
<td>*6551 x cam</td>
<td>626 AA</td>
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<tr>
<td>1</td>
<td>Electric Strike</td>
<td>9600</td>
<td>630 HS</td>
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<tr>
<td>1</td>
<td>Single Door Operator</td>
<td>SW200i (surface single)</td>
<td>689 BM</td>
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<tr>
<td>1</td>
<td>Kick Plate</td>
<td>K1050 10&quot; CSK BEV</td>
<td>US32D RO</td>
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<tr>
<td>1</td>
<td>Door Stop</td>
<td>400/403/441H (as required)</td>
<td>US26D RO</td>
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<tr>
<td>3</td>
<td>Silencer</td>
<td>608-RKW</td>
<td>RO</td>
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<td>1</td>
<td>Electric Power Transfer</td>
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<td>1</td>
<td>Frame Harness</td>
<td>QC-C1500 (as required)</td>
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<td>1</td>
<td>Door Harness</td>
<td>QC-C__ (as required)</td>
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<td>1</td>
<td>Operator Wave Activation Switch</td>
<td>WSS-W</td>
<td>SU</td>
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<td>Power Supply</td>
<td>AQC (size as req.) x PDB (as req.)</td>
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<tr>
<td>1</td>
<td>Card Reader</td>
<td>Provided by access control</td>
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</tbody>
</table>

**Notes:**

- Door normally closed and locked electronically on the egress side.
- Authorized egress by valid credential on the push side. An unauthorized egress attempt initiates an irrevocable local alarm for 15 seconds after which egress is granted.
- Ingress (pull side of door) by passage lever
- Upon the loss of power or signal from the fire alarm the doors are unlocked and closed. **Delay electronics shall be deactivated by activation of both the fire alarm and sprinklers.**
- Fail Safe.
- Coordination required for card access and automatic operator use. Electric strike required for latch release of exit device to cycle the door open.
- **Door assembly shall be listed in accordance with UL 294.**

**Set: 7.0**

Doors: 5006B, 5007B, 5113, 5138, 5162, 5183

<table>
<thead>
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<th>Finish/Type</th>
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<td>Hinge, Full Mortise</td>
<td>TA2714</td>
<td>US26D MK</td>
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<td>1</td>
<td>Electric Hinge</td>
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<td>Electrified Mortise Lock</td>
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<td>Cylinder (mortise)</td>
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<td>1</td>
<td>Door Closer</td>
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<td>EN SA</td>
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<td>Kick Plate</td>
<td>K1050 10&quot; CSK BEV</td>
<td>US32D RO</td>
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<tr>
<td>1</td>
<td>Door Stop</td>
<td>400/403/441H (as required)</td>
<td>US26D RO</td>
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<tr>
<td>3</td>
<td>Silencer</td>
<td>608-RKW</td>
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<td>Frame Harness</td>
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<td>1</td>
<td>Card Reader</td>
<td>Provided by access control</td>
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</table>
Notes:
Door normally closed and locked.
Entry by valid credential unlocking the lever on the key side of the door; mechanical key override.
Free egress at all times.

**Set: 8.0**
Doors: 5126

<table>
<thead>
<tr>
<th>Item</th>
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<td>2 Hinge, Full Mortise</td>
<td>TA2714</td>
<td>US26D MK</td>
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</tr>
<tr>
<td>1 Electric Hinge</td>
<td>TA2714-QCXX</td>
<td>US26D MK</td>
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</tr>
<tr>
<td>1 Electrified Mortise Lock</td>
<td>LC NAC-82271 LNL</td>
<td>US26D SA</td>
<td></td>
</tr>
<tr>
<td>1 Cylinder (mortise)</td>
<td>*6551 x cam</td>
<td>626 AA</td>
<td></td>
</tr>
<tr>
<td>1 Door Closer</td>
<td>351 O/P9</td>
<td>EN SA</td>
<td></td>
</tr>
<tr>
<td>1 Armor Plate</td>
<td>K1050 34&quot; CSK BEV</td>
<td>US32D RO</td>
<td></td>
</tr>
<tr>
<td>1 Door Stop</td>
<td>400/403/441H (as required)</td>
<td>US26D RO</td>
<td></td>
</tr>
<tr>
<td>3 Silencer</td>
<td>608-RKW</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>1 Frame Harness</td>
<td>QC-C1500 (as required)</td>
<td>MK</td>
<td></td>
</tr>
<tr>
<td>1 Door Harness</td>
<td>QC-C__ (as required)</td>
<td>MK</td>
<td></td>
</tr>
<tr>
<td>1 Power Supply</td>
<td>EPS-05 (as needed)</td>
<td>SU</td>
<td></td>
</tr>
<tr>
<td>1 Card Reader</td>
<td>Provided by access control</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Door normally closed and locked.
Entry by valid credential or unlocking the lever on the key side of the door; mechanical key override.
Free egress at all times.

**Set: 9.0**
Doors: 5174A

<table>
<thead>
<tr>
<th>Item</th>
<th>Model/Description</th>
<th>Set/Finish</th>
<th>Set/Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Hinge, Full Mortise</td>
<td>TA2714</td>
<td>US26D MK</td>
<td></td>
</tr>
<tr>
<td>1 Electric Hinge</td>
<td>TA2714-QCXX</td>
<td>US26D MK</td>
<td></td>
</tr>
<tr>
<td>1 Electrified Mortise Lock</td>
<td>LC NAC-82271 LNL</td>
<td>US26D SA</td>
<td></td>
</tr>
<tr>
<td>1 Cylinder (mortise)</td>
<td>*6551 x cam</td>
<td>626 AA</td>
<td></td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>351 PS</td>
<td>EN SA</td>
<td></td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; CSK BEV</td>
<td>US32D RO</td>
<td></td>
</tr>
<tr>
<td>1 Gasketing</td>
<td>S44BL</td>
<td>PE</td>
<td></td>
</tr>
<tr>
<td>1 Frame Harness</td>
<td>QC-C1500 (as required)</td>
<td>MK</td>
<td></td>
</tr>
<tr>
<td>1 Door Harness</td>
<td>QC-C__ (as required)</td>
<td>MK</td>
<td></td>
</tr>
<tr>
<td>1 Power Supply</td>
<td>EPS-05 (as needed)</td>
<td>SU</td>
<td></td>
</tr>
<tr>
<td>1 Card Reader</td>
<td>Provided by access control</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Door normally closed and locked.
Entry by valid credential or remote release unlocking the lever on the key side of the door; mechanical key override.
override.
Free egress at all times.

**Set: 10.0**
Doors: 5005A, 5006A, 5007A

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Model</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Continuous Hinge</td>
<td>FM300</td>
<td>630 MR</td>
</tr>
<tr>
<td>1 Magnetic Lock</td>
<td>M62BD</td>
<td>SU</td>
</tr>
<tr>
<td>1 Double Dummy Trim</td>
<td>8297 LNL</td>
<td>US26D SA</td>
</tr>
<tr>
<td>1 Single Door Operator</td>
<td>SW200i (surface single)</td>
<td>689 BM</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; CSK BEV</td>
<td>US32D RO</td>
</tr>
<tr>
<td>1 Door Stop</td>
<td>400/403/441H (as required)</td>
<td>US26D RO</td>
</tr>
<tr>
<td>3 Silencer</td>
<td>608-RKW</td>
<td>SU</td>
</tr>
<tr>
<td>1 Motion Sensor</td>
<td>XMS</td>
<td>SU</td>
</tr>
<tr>
<td>1 Operator Wave Activation Switch</td>
<td>WSS-W</td>
<td>SU</td>
</tr>
<tr>
<td>1 PUSH TO EXIT Button</td>
<td>EEB2</td>
<td>SU</td>
</tr>
<tr>
<td>1 Position Switch</td>
<td>DPS-M-BK</td>
<td>SU</td>
</tr>
<tr>
<td>1 Power Supply</td>
<td>AQD (size as req.) x PDB (as req.)</td>
<td>SU</td>
</tr>
<tr>
<td>1 Card Reader</td>
<td>Provided by access control</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
Door normally closed and locked electromagnetically.
Enter by valid credential releasing the electromagnetic lock.
Free egress at all times by motion sensor or PUSH TO EXIT button.
Coordination required for card access and automatic operator use.

**Set: 11.0**
Doors: 5100A, 5100B

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Model</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hinge, Full Mortise</td>
<td>TA2714</td>
<td>US26D MK</td>
</tr>
<tr>
<td>1 Storeroom Lock</td>
<td>LC 8204 LNL</td>
<td>US26D SA</td>
</tr>
<tr>
<td>1 Cylinder (mortise)</td>
<td>*6551 x cam</td>
<td>626 AA</td>
</tr>
<tr>
<td>1 Door Closer</td>
<td>351 O/P9</td>
<td>EN SA</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; CSK BEV</td>
<td>US32D RO</td>
</tr>
<tr>
<td>1 Door Stop</td>
<td>400/403/441H (as required)</td>
<td>US26D RO</td>
</tr>
<tr>
<td>1 Gasketing</td>
<td>S44BL</td>
<td>PE</td>
</tr>
</tbody>
</table>

**Set: 12.0**
Doors: 5176

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Model</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hinge, Full Mortise</td>
<td>TA2714</td>
<td>US26D MK</td>
</tr>
<tr>
<td>1 Office Lock</td>
<td>LB LC 8205 LNL</td>
<td>US26D SA</td>
</tr>
<tr>
<td>1 Cylinder (mortise)</td>
<td>*6551 x cam</td>
<td>626 AA</td>
</tr>
<tr>
<td>1 Surface Overhead Stop</td>
<td>10-X36</td>
<td>630 RF</td>
</tr>
<tr>
<td>1 Gasketing</td>
<td>S44BL</td>
<td>PE</td>
</tr>
<tr>
<td>1 Door Bottom</td>
<td>STC411APK</td>
<td>PE</td>
</tr>
</tbody>
</table>

**Set: 13.0**

HDR Project No. 10102114
IMED Cardiovascular Clinic
DOOR HARDWARE
08 71 00 - 19
<table>
<thead>
<tr>
<th>Set: 14.0</th>
<th>Doors: 5109, 5124, 5130, 5147, 5156, 5171</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Acting Hinge</td>
<td>DSHP01C</td>
</tr>
<tr>
<td>Privacy Lock</td>
<td>LB V21 8265 LNL</td>
</tr>
<tr>
<td>Mop Plate</td>
<td>K1050 6” CSK BEV</td>
</tr>
<tr>
<td>Kick Plate</td>
<td>K1050 10” CSK BEV</td>
</tr>
<tr>
<td>Door Stop</td>
<td>400/403/441H (as required)</td>
</tr>
<tr>
<td>Emergency Release Stop</td>
<td>ERSXXC-NOTCHxHT-XX</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set: 15.0</th>
<th>Doors: 5106, 5128</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Acting Hinge</td>
<td>DSHP01C</td>
</tr>
<tr>
<td>Privacy Lock</td>
<td>LB V21 8266 LNL</td>
</tr>
<tr>
<td>Door Closer</td>
<td>351 O/P9</td>
</tr>
<tr>
<td>Mop Plate</td>
<td>K1050 6” CSK BEV</td>
</tr>
<tr>
<td>Kick Plate</td>
<td>K1050 10” CSK BEV</td>
</tr>
<tr>
<td>Door Stop</td>
<td>400/403/441H (as required)</td>
</tr>
<tr>
<td>Gasketing</td>
<td>S44BL</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Set: 16.0</th>
<th>Doors: 5105, 5134, 5174B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Acting Hinge</td>
<td>TA2714</td>
</tr>
<tr>
<td>Passage Set</td>
<td>8215 LNL</td>
</tr>
<tr>
<td>Door Stop</td>
<td>400/403/441H (as required)</td>
</tr>
<tr>
<td>Silencer</td>
<td>608-RKW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set: 17.0</th>
<th>Doors: 5104</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Acting Hinge</td>
<td>TA2714</td>
</tr>
<tr>
<td>Passage Set</td>
<td>8215 LNL</td>
</tr>
<tr>
<td>Door Stop</td>
<td>400/403/441H (as required)</td>
</tr>
<tr>
<td>Silencer</td>
<td>608-RKW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Acting Hinge</td>
<td>TA2714</td>
</tr>
<tr>
<td>Passage Set</td>
<td>8215 LNL</td>
</tr>
<tr>
<td>Door Stop</td>
<td>400/403/441H (as required)</td>
</tr>
<tr>
<td>Acoustic Seal Set (STC 45)</td>
<td>PEMKOSTCSET-1B</td>
</tr>
</tbody>
</table>

| Set: 19.0 |
| --- | --- |
| Acoustic Seal Set (STC 45) | PEMKOSTCSET-1B |

3 Hinge, Full Mortise
1 Passage Set
1 Surface Overhead Stop
1 Acoustic Seal Set (STC 45)

**Set: 20.0**

1 Hardware

**Set: 21.0**
Doors: 5112A, 5137A, 5161A

1 Power Supply
5 Hardware
1 Card Reader

**Set: 22.0**
Doors: 5101, 5102

1 Existing

END OF SECTION
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SECTION 12 24 13
ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY
A. Furnish labor, materials, tools, equipment, and services for Roller Shades, as indicated, in accordance with provisions of Contract Documents.
B. Completely coordinate with work of other trades.

1.2 QUALITY ASSURANCE
A. Manufacturer Qualifications:
   1. Obtain roller shades through one source from a single manufacturer.
   2. Minimum twenty (20) years’ experience in manufacturing products comparable to those specified in this section.
B. Installer Qualifications:
   1. Installer trained and certified by manufacturer with a minimum of ten (10) years’ experience installing products comparable to those specified in this section.
C. ASTM International (ASTM):
   1. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
   2. No growth for fungi ATCC9642, ATCC 9644, ATCC9645.
D. National Fire Protection Association (NFPA):
   1. NFPA 70 National Electrical Code.
   3. NFPA Article 100 Electrical components listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system.
E. Mockup:
   1. Provide a mockup, for manual shades only, of one roller shade assembly for evaluation of mounting, appearance and accessories.
   2. Locate mockup at opening designated by Architect.
   3. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.3 SUBMITTALS
A. Shop Drawings:
   1. Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
B. Product Data:
   1. Manufacturer’s data sheets on each product to be used, including:
      a. Preparation instructions and recommendations.
      b. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
      c. Storage and handling requirements and recommendations.
      d. Mounting details and installation methods.
      e. Window treatment schedule:
         1) Use same room designations as indicated on Drawings and include opening sizes and key to typical mounting details.
C. Samples:
1. Provide for each finish product specified,
   a. One set of shade cloth options and aluminum finish color samples representing
      manufacturer's full range of available colors and patterns.
   b. One set of shade components, unassembled, demonstrating compliance with specified
      requirements.
      1) Shadecloth sample and aluminum finish sample as selected.
      2) Mark face of material to indicate interior faces.

D. Contract Closeout Information:
1. Warranty.
2. Maintenance Data:
   a. See Section 01 78 23.

1.4 WARRANTY
A. Roller Shade Hardware: Manufacturer's standard non-depreciating 25 year limited warranty.
B. Shadecloth: Manufacturer's standard non-depreciating 10 year limited warranty.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Roller Shades:
   1. Base:
      a. MechoShade Systems.
   2. Optional:
      a. Draper.
      c. Lutron, Vimco.
B. Other manufacturers desiring approval comply with Section 01 61 00.

2.2 MATERIALS
A. Transparent Single-Fabric Shadecloth:
   1. ThermoVeil by MechoShade Systems, Inc. to match existing, V.I.F.
   2. Single thickness 0.030 IN vinyl fabric to match existing, V.I.F.
   3. Open Basket Weave: 2100 Series, 10 PCT open.
   5. Dense Basket Weave: 1500 Series, 3 PCT open.
   6. Translucent, twill-weave pattern:
   7. Color: To match existing, V.I.F.
B. Vinyl Room Darkening Shadecloth:
   1. Classic Blackout 0700 Series (opaque) by MechoShade Systems, Inc. to match existing, V.I.F.
   2. Laminated blackout embossed vinyl coated single fabric to match existing, V.I.F.
   3. Fabric thickness: 0.012 IN thick
   4. Fabric weight: 0.81 LBS/SY
   5. Opacity: 0 PCT open.
   6. Color: As selected from manufacturer's standard colors, to match existing, V.I.F.

2.3 COMPONENTS
A. All components listed below as basis of design. Actual products shall match existing conditions;
   verify existing in field.
B. Motorized Shade Hardware and Shade Brackets:
   1. Minimum 1/8 IN thick plated steel.
2. Field adjustable.

C. Manual Operated Chain Drive Hardware and Brackets:
   1. Adjustable universal, regular and offset drive capacity.
   2. Removable fascia with concealed fasteners.
   3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
   4. Provide multiple shade operation by a single chain operator.
   5. Minimum 1/8 IN thick plated steel.
   6. Drive Bracket and Brake Assembly:
      a. Model M5:
         1) SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
      b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 IN steel pin.
      c. Brake pull force: 50 LBS in stopped position.
      d. Permanently lubricated assembly.
      e. Mount on the steel support bracket, independent of shade tube assembly.

D. Drive Chain:
   1. No.10 stainless steel chain
   2. Rating: 90 LBS, minimum.

E. Shade Motors:
   1. Tubular, non-synchronous reversible motors, thermally protected.
   2. Conceal motors inside shade roller tube.

F. Motor Control System:
   1. IQ/MLC motor logic control system by MechoShade Systems, Inc.
      a. Wall Switches:
         1) Three-button architectural flush mounted switches with metal cover plate and concealed fasteners.
      2. ICONF Control System by MechoShade Systems, Inc.
         a. Wall Switches:
            1) Four (4) button low voltage standard switches or programmable intelligent switches.

2.4 ACCESSORIES

A. Roller Shade Pocket for recessed mounting in acoustical tile or GWB ceilings for Shade Type _:
   1. Provide either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
      a. Vent Shade Pocket with a minimum of four 1 IN diameter holes per foot allowing the solar gain to flow above the ceiling line.

B. Fascia for Shade Type _:
   1. Continuous extruded aluminum.
   2. Conceal brackets, shade roller and fabric.
   3. Provide bracket / fascia end caps.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION
A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION
A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 IN to interior face of glass.
B. Allow clearances for window operation hardware.
C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
E. Train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION
A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 SCHEDULE
A. Shade Type 1:
   2. Sunscreen roller shades.
   3. Provide at exterior windows of rooms and spaces shown on Drawings.
B. Shade Type 2:
   2. Room darkening roller shades with blackout fabric in
   3. Provide at exterior windows of rooms and spaces shown on Drawings.
C. Shade Type 3:
   2. Double solar and room darkening blackout roller shades, operating independently of each other.
   3. Provide at exterior windows of rooms and spaces shown on Drawings.
D. Shade Type 4:
   1. Motorized interior solar roller shades and related motor control systems.
   2. Provide in exterior windows of rooms and spaces shown on Drawings.
E. Shade Type 5:
   2. Provide at exterior windows of rooms and spaces shown on Drawings.
F. Shade Type 6:
   1. Motorized interior double, solar and room darkening blackout roller shades and related motor control systems.
   2. Operate independently of each other.
   3. Provide at exterior windows of rooms and spaces shown on Drawings.

END OF SECTION
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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following fire-suppression piping inside the building:
   1. Automatic wet-type, 2-1/2 inch hose valves in core stairwells.
   2. Wet-pipe sprinkler systems.
   3. Summary and Description: Remove and replace fire sprinkler piping (branches and mains if necessary) and relocate sprinkler heads to match the new floorplan and layout, as well as the new ceiling heights. Quick response, standard coverage, concealed sprinklers with architecturally coordinated finishes are anticipated.

B. Related Sections include the following:
   1. Division 10 Section "Fire Extinguisher Cabinets" and "Fire Extinguishers" for cabinets and fire extinguishers.
   2. Division 22 Section "Facility Water Distribution Piping" for piping outside the building.
   3. Division 28 Section "Fire Detection and Alarm" for alarm devices not specified in this Section.

C. All black steel sprinkler pipe shall have a wall thickness less than or equal to schedule 40 and greater than schedule 10.

D. Exception: Pipe with a nominal pipe size of 6 inches and greater may be schedule 10.

E. All fire protection equipment, including piping, hangers, control valves, shall be UL listed. A copy of the manufacturer’s specification sheet for each specific component installed shall be included with shop drawings.

F. Summary Table:

<table>
<thead>
<tr>
<th>Item</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior pipe type</td>
<td>Mains: Schedule 40 Branch-lines: Threadable thin-wall or schedule 40</td>
</tr>
<tr>
<td>Sprinkler Finish</td>
<td>Flat Plate Concealed with white cover plate, except uprights and storage Sprinklers in architectural, clouds, or non-white colored ceilings are to have finishes coordinated with architect.</td>
</tr>
<tr>
<td>Extended Coverage</td>
<td>Not Allowed</td>
</tr>
<tr>
<td>Center of Tile</td>
<td>Required, Center thirds are acceptable</td>
</tr>
<tr>
<td>Flexible Sprinkler Drops</td>
<td>Required</td>
</tr>
<tr>
<td>FM Global</td>
<td>No</td>
</tr>
<tr>
<td>Calculations</td>
<td>General hydraulic analysis is required to prove proposed design. Complete hydraulic calculations are required at each node if existing design intent is changed. Use reduced flow data and existing pump data.</td>
</tr>
<tr>
<td>Alarm Device</td>
<td>Coordinate installation with local Fire Department</td>
</tr>
</tbody>
</table>
## Special Items

<table>
<thead>
<tr>
<th>Hose Valves</th>
<th>Located in stairwells, to remain as is.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract bears liability for removal and rearrangement of any suppression items which are in conflict with new design.</td>
<td></td>
</tr>
</tbody>
</table>

### 1.3 Definitions

A. CPVC: Chlorinated polyvinyl chloride plastic.

B. CR: Chlorosulfonated polyethylene synthetic rubber.

C. High-Pressure Piping System: Fire-suppression piping system designed to operate at working pressure higher than standard 175 psig.

D. PE: Polyethylene plastic.

E. Underground Service-Entrance Piping: Underground service piping below the building.

### 1.4 System Descriptions

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device.

### 1.5 Performance Requirements


B. High-Pressure Piping System Component Working Pressure: Listed for 250 psig minimum 300 psig.

C. Fire-suppression standpipe system design shall be approved by authorities having jurisdiction.

1. Minimum residual pressure at each hose-connection outlet is the following:
   a. NPS 1-1/2 Hose Connections: 65 psig.
   b. NPS 2-1/2 Hose Connections: 100 psig.

2. Unless otherwise indicated, the following is maximum residual pressure at required flow at each hose-connection outlet:
   a. NPS 1-1/2 Hose Connections: 100 psig.
   b. NPS 2-1/2 Hose Connections: 175 psig.

D. Design sprinkler piping according to the following and obtain approval from engineer, prior to submitting to other authorities having jurisdiction:

1. Design sprinkler system with the following 10% reduction:

   Flow test data available at Intermountain Drive north of 5300 south.

   Static – 81 psi

   Residual – 69 psi @ 2,251 gpm flowing

   Date of Test – 06/24/2020 by VBFA, Inc.

2. Sprinkler Occupancy Hazard Classifications:
   a. Building Service Areas: Ordinary Hazard, Group 1.
   b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
   c. General Storage Areas: Ordinary Hazard, Group 1.
   d. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
   e. Office and Public Areas: Light Hazard.
f. Medical Records: Ordinary Hazard, Group 2

3. Minimum Density for Automatic-Sprinkler Piping Design:
   a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
   b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
   c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
   d. Special Occupancy Hazard: As determined by authorities having jurisdiction.

4. Maximum Protection Area per Sprinkler: Per UL listing.

5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13, unless otherwise indicated:
   a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
   b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.

1.6 SUBMITTALS

A. Product Data: For the following:
   1. Piping materials, including dielectric fittings, flexible connections with chosen length
      and number of bends, and sprinkler specialty fittings.
   2. Pipe hangers and supports, including seismic restraints.
   3. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting,
      finish, and other pertinent data.

B. Fire-hydrant flow test report.

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that
   have been approved by authorities having jurisdiction, including hydraulic calculations, if
   applicable. Drawings are to be approved by Engineer prior to submission to State Fire Marshal.

D. Field Test Reports and Certificates: Indicate and interpret test results for compliance with
   performance requirements and as described in NFPA 13 and NFPA 14. Include "Contractor's
   Material and Test Certificate for Aboveground Piping".

E. Welding certificates.

F. Field quality-control test reports.

G. Operation and Maintenance Data: For hose valves and sprinkler specialties to include in
   emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:
   1. An experienced installer who has designed and installed fire-suppression piping similar
      to that indicated for this Project and obtained design approval and inspection approval
      from authorities having jurisdiction. The Engineer requires evidence to support the
      ability of the contractor to perform work in the scope and volume as specified. A
      contractor, who cannot show such experience, may be found not suitable to perform the
      work. The following are the approved contractors for this project:
   a. PRE-APPROVED CONTRACTORS LIST
      1) Alta Fire
      2) Certified Fire
      3) Chaparral Fire
      4) Delta Fire
      5) Kimco Fire
      6) Preferred Fire Protection
      7) Quality Fire Protection
8) Fire Services Inc.
9) FireTrol
10) FireFly Fire Protection
11) Simplex-Grinnell
12) State Fire DC Specialties
13) The Safety Team
14) Western Automatic
15) Or prior approved equal

b. A contractor not listed in the “PRE-APPROVED CONTRACTORS LIST” must receive prior approval from the engineer to bid this project.

B. Installer’s responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
   1. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer or NICET Level III technician.

C. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

D. NFPA Standards: Fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with the following:
   1. NFPA 13, "Installation of Sprinkler Systems."

E. International Conference of Building Code Officials codes and standards complying with the following:
   3. Utah Amendments

1.8 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Contractor to remove and reroute any and all fire sprinkler piping and equipment in coordination with other disciplines and with engineer of record, to accommodate the routing of mechanical, plumbing, and other disciplines as necessary for the completion of the project.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Sprinkler Cabinets: Finished, wall-mounting, steel cabinet with hinged cover, with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

A. Threaded-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or field-formed threaded ends.
   5. Steel Threaded Couplings: ASTM A 865 hot-dip galvanized-steel pipe where indicated.

   1. Locking-Lug Fittings: UL 213, ductile-iron body with retainer lugs that require one-quarter turn to secure pipe in fitting not allowed.

   2. Steel Flanges and Flanged Fittings: ASME B16.5.

   1. Grooved-Joint Piping Systems:
      a. Manufacturers:
         1) Anvil International, Inc.
         2) Central Sprinkler Corp.
         3) Victaulic Co. of America.
      b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
      c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, pre-lubricated rubber gasket listed for use with housing, and steel bolts and nuts.

E. Threaded-End, Threadable, Thin-wall Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and greater than Schedule 10, and with factory- or field-formed threaded ends.
   5. Steel Threaded Couplings: ASTM A 865.

F. Plain-End, Threadable, Thin-wall Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and greater than Schedule 10.
   1. Locking-Lug Fittings: UL 213, ductile-iron body with retainer lugs that require one-quarter turn to secure pipe in fitting not allowed.

G. Plain-End, Threadable, Thin-wall Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and greater than Schedule 10.
   2. Steel Flanges and Flanged Fittings: ASME B16.5.
H. Grooved-End, Threadable, Thin-wall Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and greater than Schedule 10, and with factory- or field-formed, roll-grooved ends.
   1. Grooved-Joint Piping Systems:
      a. Manufacturers:
         1) Anvil International, Inc.
         2) Central Sprinkler Corp.
         3) Victaulic Co. of America.
      b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
      c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, pre-lubricated rubber gasket listed for use with housing, and steel bolts and nuts.
I. Plain-End, Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 is not allowed.
J. Plain-End, Nonstandard OD, Thin-wall Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 10 is not allowed.
K. Plain-End, Hybrid Steel Pipe: ASTM A 135 or ASTM A 795, light-wall, with wall thickness less than Schedule 10 and greater than Schedule 5 is not allowed.
L. Grooved-End, Hybrid Steel Pipe: ASTM A 135 or ASTM A 795, light-wall, with wall thickness less than Schedule 10 and greater than Schedule 5; with factory- or field-formed, roll-grooved ends are not allowed.
M. Schedule 5 Steel Pipe: ASTM A 135 or ASTM A 795, light-wall, with plain ends is not allowed.

2.3 CPVC TUBE AND FITTINGS
A. CPVC is not allowed.

2.4 COPPER TUBE AND FITTINGS
A. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper; with plain ends.
   2. Brazing Filler Metals: AWS A5.8, BCuP-3 or BCuP-4.
B. Plain-End, Hard Copper Tube: ASTM B 88, Type K or ASTM B 88, Type L, water tube, drawn temper.
   2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match tubing system.
   3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-socket body with ball-and-socket metal-to-metal seating surfaces, and solder-joint or threaded ends.
   4. Copper, Mechanically Formed Tee Option: For forming T-branch on copper water tube not allowed.
   5. Brazing Filler Metals: AWS A5.8, BCuP-3 or BCuP-4.
C. Grooved-End, Hard Copper Tube: ASTM B 88, Type K or ASTM B 88, Type L, water tube, drawn temper; with factory- or field-formed, roll-grooved ends.
   1. Copper, Mechanically Formed Tee Option: For forming T-branch on copper water tube not allowed.
   2. Grooved-Joint Systems:
a. Manufacturers:
   1) Anvil International, Inc.
   2) Victaulic Co. of America.

b. Grooved-End Copper Fittings: ASTM B 75, copper tube or ASTM B 584, bronze casting. Fittings may have ends factory or field expanded to steel-pipe OD if required for copper tube systems using grooved-end-pipe couplings.

c. Grooved-End-Tube Couplings: UL 213, rigid pattern, unless otherwise indicated; gasketed fitting equivalent to AWWA C606, but made to match copper-tube OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, pre-lubricated rubber gasket listed for use with housing, and steel bolts and nuts. Use grooved-end-pipe couplings for tube and fitting that have expanded ends.

2.5 DIELECTRIC FITTINGS

A. Assembly shall be copper alloy, ferrous, and insulating materials with ends matching piping system.

B. Dielectric Unions: Factory-fabricated assembly, designed for 250-psig minimum working pressure at 180 deg F. Include insulating material that isolates dissimilar materials and ends with inside threads according to ASME B1.20.1.
   1. Manufacturers:
      a. Capitol Manufacturing Co.
      b. Central Plastics Company.
      c. Epco Sales, Inc.
      d. Hart Industries International, Inc.
      e. Watts Industries, Inc.; Water Products Div.
      f. Zurn Industries, Inc.; Wilkins Div.

C. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 175-psig minimum working-pressure rating as required for piping system.
   1. Manufacturers:
      a. Capitol Manufacturing Co.
      b. Central Plastics Company.
      c. Epco Sales, Inc.

D. Dielectric Flange Insulation Kits: Components for field assembly shall include CR or phenolic gasket, PE or phenolic bolt sleeves, phenolic washers, and steel backing washers.
   1. Manufacturers:
      a. Advance Products and Systems, Inc.
      b. Calpico, Inc.
      c. Central Plastics Company.
      d. Pipeline Seal and Insulator, Inc.
      e. Insert manufacturer's name.

E. Dielectric Couplings: Galvanized steel with inert and noncorrosive thermoplastic lining and threaded ends and 300-psig working-pressure rating at 225 deg F.
   1. Manufacturers:
      a. Calpico, Inc.
      b. Lochinvar Corp.

F. Dielectric Nipples: Electroplated steel with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved ends and 300-psig working-pressure rating at 225 deg F.
   1. Manufacturers:
      a. Perfection Corporation.
      b. Precision Plumbing Products, Inc.
      c. Victaulic Co. of America.
2.6 FLEXIBLE CONNECTORS (SEISMIC SEPARATION ASSEMBLY)

A. Flexible connectors shall have materials suitable for system fluid. Include 175-psig minimum working-pressure rating and ends according to the following:
   1. NPS 2 and Smaller: Threaded.
   2. NPS 2-1/2 and Larger: Grooved for use with grooved-end-pipe couplings.

B. Manufacturers:
   1. Flex-Hose Co., Inc.
   2. Metraflex, Inc.

C. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.

D. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

E. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose.

2.7 FLEXIBLE SPRINKLER DROPS

A. Flexible connectors shall have materials suitable for system fluid. Include 175-psig minimum working-pressure rating and ends according to the following:

B. Manufacturers:
   1. Victaulic
   2. Flexhead

C. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose.

2.8 SPRINKLER SPECIALTY FITTINGS

A. Sprinkler specialty fittings shall be FMG approved, with 175-psig minimum working-pressure rating, and made of materials compatible with piping. Sprinkler specialty fittings shall have 250-psig minimum working-pressure rating if fittings are components of high-pressure piping system.

B. Sprinkler Drain and Alarm Test Fittings: Cast- or ductile-iron body; with threaded or locking-lug inlet and outlet, test valve, and orifice and sight glass.
   1. Manufacturers:
      a. Central Sprinkler Corp.
      b. Fire-End and Croker Corp.
      c. Viking Corp.
      d. Victaulic Co. of America.

C. Sprinkler Branch-Line Test Fittings: Brass body with threaded inlet, capped drain outlet, and threaded outlet for sprinkler.
   1. Manufacturers:
      b. Fire-End and Croker Corp.
      c. Potter-Roemer; Fire-Protection Div.

D. Sprinkler Inspector's Test Fitting: Cast- or ductile-iron housing with threaded inlet and drain outlet and sight glass.
   1. Manufacturers:
      a. AGF Manufacturing Co.
b. Central Sprinkler Corp.
c. G/J Innovations, Inc.
d. Triple R Specialty of Ajax, Inc.

E. Drop-Nipple Fittings: UL 1474, adjustable with threaded inlet and outlet, and seals.
   1. Manufacturers:
      a. CECA, LLC.
      b. Merit.

F. 2.9 LISTED FIRE-PROTECTION VALVES

A. Valves shall be FMG approved, with 175-psig minimum pressure rating. Valves shall have 250-psig minimum pressure rating if valves are components of high-pressure piping system.

B. Ball Valves: Comply with UL 1091, except with ball instead of disc.
   1. NPS 1-1/2 and Smaller: Bronze body with threaded ends.
   2. NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
   3. NPS 3: Ductile-iron body with grooved ends.
   4. Manufacturers:
      a. NIBCO.
      b. Victaulic Co. of America.

C. Butterfly Valves: UL 1091.
   1. NPS 2 and Smaller: Bronze body with threaded ends.
      a. Manufacturers:
         1) Global Safety Products, Inc.
         2) Milwaukee Valve Company.
   2. NPS 2-1/2 and Larger: Bronze, cast-iron, or ductile-iron body; wafer type or with flanged or grooved ends.
      a. Manufacturers:
         1) Central Sprinkler Corp.
         2) McWane, Inc.; Kennedy Valve Div.
         3) Mueller Company.
         4) NIBCO.
         5) Victaulic Co. of America.

D. Check Valves NPS 2 and Larger: UL 312, swing type, cast-iron body with flanged or grooved ends.
   1. Manufacturers:
      b. Central Sprinkler Corp.
      c. Clow Valve Co.
      d. Crane Co.; Crane Valve Group; Crane Valves.
      e. Crane Co.; Crane Valve Group; Jenkins Valves.
      g. Grinnell Fire Protection.
      h. Hammond Valve.
      i. McWane, Inc.; Kennedy Valve Div.
      j. Mueller Company.
      k. NIBCO.
      l. Potter-Roemer; Fire Protection Div.
      m. Reliable Automatic Sprinkler Co., Inc.
      n. Star Sprinkler Inc.
      o. Stockham.
E. Gate Valves: UL 262, OS&Y type.
   1. NPS 2 and Smaller: Bronze body with threaded ends.
      a. Manufacturers:
         1) Crane Co.; Crane Valve Group; Crane Valves.
         2) Hammond Valve.
         3) NIBCO.
         4) United Brass Works, Inc.
   2. NPS 2-1/2 and Larger: Cast-iron body with flanged ends.
      a. Manufacturers:
         1) Clow Valve Co.
         2) Crane Co.; Crane Valve Group; Crane Valves.
         3) Crane Co.; Crane Valve Group; Jenkins Valves.
         4) Hammond Valve.
         5) Milwaukee Valve Company.
         6) Mueller Company.
         7) NIBCO.
         8) United Brass Works, Inc.

F. Indicating Valves: UL 1091, with integral indicating device and ends matching connecting piping.
   1. Indicator: Electrical, 115-V ac, prewired, single-circuit, supervisory switch and Visual.
   2. NPS 2 and Smaller: Ball or butterfly valve with bronze body and threaded ends.
      a. Manufacturers:
         1) Milwaukee Valve Company.
         2) NIBCO.
         3) Victaulic Co. of America.
   3. NPS 2-1/2 and Larger: Butterfly valve with cast- or ductile-iron body; wafer type or with flanged or grooved ends.
      a. Manufacturers:
         1) Central Sprinkler Corp.
         2) Grinnell Fire Protection.
         3) McWane, Inc.; Kennedy Valve Div.
         4) Milwaukee Valve Company.
         5) NIBCO.
         6) Victaulic Co. of America.

2.10 UNLISTED GENERAL-DUTY VALVES

A. Ball Valves NPS 2 and Smaller: MSS SP-110, 2-piece copper-alloy body with chrome-plated brass ball, 600-psig minimum CWP rating, blowout-proof stem, and threaded ends.

B. Check Valves NPS 2 and Smaller: MSS SP-80, Type 4, Class 125 minimum, swing type with bronze body, nonmetallic disc, and threaded ends.

C. Gate Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, solid wedge, and threaded ends.

D. Globe Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, nonmetallic disc, and threaded ends.

2.11 SPECIALTY VALVES

A. Sprinkler System Control Valves: FMG approved, cast- or ductile-iron body with flanged or grooved ends, and 175-psig minimum pressure rating. Control valves shall have 250-psig minimum pressure rating if valves are components of high-pressure piping system.
1. Manufacturers:
   a. Central Sprinkler Corp.
   c. Grinnell Fire Protection.
   d. Reliable Automatic Sprinkler Co., Inc.
   e. Star Sprinkler Inc.
   f. Victaulic Co. of America.
   g. Viking Corp.

2.12 SPRINKLERS

A. Sprinklers shall be UL listed or FMG approved, with 175-psig minimum pressure rating. Sprinklers shall have 250-psig minimum 300-psig pressure rating if sprinklers are components of high-pressure piping system.

B. Manufacturers:
   2. Reliable Automatic Sprinkler Co., Inc.
   3. Tyco Fire Products
   4. Victaulic Co. of America.
   5. Viking Corp.

C. Automatic Sprinklers: With heat-responsive element complying with the following:
   1. UL 199, for nonresidential applications.

D. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.

E. Sprinkler types, features, and options as follows:
   1. Concealed ceiling sprinklers, including flat white cover plate.
   2. Concealed ceiling sprinklers, including color matched cover plate.
   3. Sidewall, flat plate concealed.
   4. Medium temperature bulb, where required.
   5. Extended-coverage sprinklers, not allowed.
   6. Flush ceiling sprinklers, including escutcheon, not allowed.
   7. Quick-response sprinklers.
   8. Pendent sprinklers.
   10. Upright sprinklers.

F. Sprinkler body and deflector finishes: Contractors choice.

G. Special Coatings: Wax, lead, and corrosion-resistant paint.

H. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
   1. Ceiling Mounting: Color coordinated flat concealed.
   2. Sidewall Mounting: Color coordinated flat concealed.

I. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

2.13 PRESSURE GAGES

A. Manufacturers:
   3. Marsh Bellofram.
   4. WIKA Instrument Corporation.
B. Description: UL 393, 3-1/2- to 4-1/2-inch-diameter, dial pressure gage with range of 0 to 250 psig minimum.
   1. Water System Piping: Include caption "WATER" or "AIR/WATER" on dial face.
   2. Air System Piping: Include retard feature and caption "AIR" or "AIR/WATER" on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Engineer’s Water Analysis. See Flow Analysis provided by Van Boerum & Frank Associates.

3.2 EXAMINATION

A. Examine roughing-in for hose connections and stations to verify actual locations of piping connections before installation.

B. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PIPING APPLICATIONS

A. Shop-weld pipe joints where welded piping is indicated.

B. Do not use welded joints for galvanized-steel pipe.

C. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

D. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.

E. Underground Service-Entrance Piping: Ductile-iron, push-on or mechanical-joint pipe and fittings and restrained joints. Include corrosion-protective encasement.

F. Sprinkler Main Piping: Use the following:
   1. NPS 6 and Smaller: Standard-weight steel pipe with threaded ends, or grooved ends. No plain ends allowed.
   2. Outlets shall be welded.
      a. Victaulic Brand Mechanical tee fittings may be used in lieu of welded outlets.

G. Branch line piping: Use the following:
   1. NPS 2 and Smaller: Threadable steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
      a. Victaulic Brand Mechanical tee fittings may be used

3.4 JOINT CONSTRUCTION

A. Refer to Division 23 Section "Common Work Result for HVAC" for basic piping joint construction.

B. Ductile-Iron-Piping, Grooved Joints: Use ductile-iron pipe with radius-cut-grooved ends; ductile-iron, grooved-end fittings; and ductile-iron, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer’s written instructions.
C. Steel-Piping, Grooved Joints: Use Schedule 40 steel pipe with cut or roll-grooved ends and Schedule 30 or thinner steel pipe with roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.

3.5 WATER-SUPPLY CONNECTION

A. Install shutoff Backflow preventions assemblies, valve, pressure gage’s, drain, and other accessories at connection to water service.

3.6 PIPING INSTALLATION

A. Refer to Division 23 Section "Common Work Result for HVAC" for basic piping installation.

B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
   1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

C. Make connections between underground and above-ground piping using bolted flange.

D. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.

F. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.

G. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install alarm devices in piping systems.

J. Hangers and Supports: Comply with NFPA 13 for hanger materials. Install according to NFPA 13 for sprinkler piping.
   1. No powder driven studs allowed.
   2. Wrap-around braces are to be provided at end of branch lines.

K. Earthquake Protection: Install piping according to NFPA 13 Chapter 9 requirements to protect from earthquake damage. Seismic Bracing shall be designed to withstand vertical forces and movement.

L. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated, or required by NFPA 13 for flexibility in seismic zones.

M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal and install where they will not be subject to freezing.

3.7 SPECIALTY SPRINKLER FITTING INSTALLATION

A. Install specialty sprinkler fittings according to manufacturer's written instructions.
3.8 SPRINKLER APPLICATIONS

A. General: All sprinklers are to be quick response type. Sprinkler heads shall be of the latest design closed spray type for 155°F unless specified otherwise or required by code. Extended coverage heads shall not be used. Orifices larger than 1/2" may be used as required by density and spacing demands. Use sprinklers according to the following applications:

1. Rooms without Ceilings: Upright and/or pendent sprinklers. Provide mechanical guards on all heads at or below 7'-0" height above the floor or where damage from room occupant use may occur.
2. Rooms with Ceilings: Flat plate concealed with color matched cover plate.
4. Heads located within the air streams of unit heaters or other heat-emitting equipment shall be selected for proper temperature rating.
5. Sprinklers in sterile room shall be rated at 200 degrees F. See drawing for location.

B. Sprinklers: Use the following:

1. All sprinklers shall be listed, quick response type.
2. Sprinkler in future finish spaces (shelled) 10’ x 10’ spacing shall be pendants/uprights installed with 1 x 1/2” bushing, to accommodate future finishes.

3.9 SPRINKLER INSTALLATION

A. Every effort shall be required to ensure that the heads form a symmetrical pattern in the ceiling with the ceiling grid, lights, diffusers and grilles. Offsets shall be made in piping to accommodate ductwork in the ceiling. Heads should be symmetrical and all piping run parallel or perpendicular to building lines.

1. In no case shall sprinkler heads be installed closer than approved distances from ceiling obstructions and HVAC ductwork.
2. Sprinkler heads shall not conflict with tile grids.
3. Sprinkler heads shall be located near center of corridors.

B. Where layout of sprinkler heads is shown on reflected ceiling plans the locations shall be followed unless approval is obtained from the Architect or such locations shown do not meet the requirements of NFPA-13. In either case, approval of the Architect shall be obtained in writing before sprinkler head locations are changed. If the installation of additional heads is needed to conform to NFPA 13 requirements in areas where heads are shown on reflected ceiling plans, they shall be included in the contract price.

C. Install sprinklers in patterns indicated.

D. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.

E. Future finish shelled and tenant finish; Shell spaces shall be piped to accommodate future. Install sprinklers with 1" x 1/2" bushings, and space heads at a maximum spacing of 100 sq. ft. per head. Occupancy shall be Ordinary-Hazard Group 1 Design.

F. Concealed type sprinkler shall be installed in the following areas:

1. Throughout.

3.10 CONNECTIONS

A. Connect water-supply piping and standpipes and sprinklers where indicated.

B. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.

3.11 LABELING AND IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and in Division 23 Section "Common Work Result for HVAC."
3.12 FIELD QUALITY CONTROL
   A. Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.
   B. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
   C. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.13 CLEANING
   A. Clean dirt and debris from sprinklers.
   B. Remove and replace sprinklers having paint other than factory finish.

3.14 PROTECTION
   A. Protect sprinklers from damage until Substantial Completion.
3.15 COMMISSIONING
A. Verify that specified tests of piping are complete and that “Material Test Certificates” are complete.
B. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.
C. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
D. Verify that hose connections have threads compatible with local fire department equipment.
E. Fill wet-pipe sprinkler piping with water.
F. Fill standpipes with water.
G. Verify that hose connections are correct type and size.
H. Coordinate with fire alarm tests. Operate as required.

3.16 DEMONSTRATION & TESTS
A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
B. All tests will be conducted as required by the local authority having jurisdiction, and in no case less than those required by NFPA standards. As a minimum, piping in the sprinkler system shall be tested at a water pressure at 200 psi for a period of not less two hours, or at 50 psi in excess of the normal pressure when the normal pressure is above 150 psi. Bracing shall be in place, and air shall be removed from the system through the hydrants and drain valves before the test pressure is applied. No apparent leaks will be permitted on interior or underground piping.
C. The local jurisdiction having authority and the Utah State Fire Marshal's office (where required) shall be notified at least three working days in advance of all tests and flushing. This includes any flushing of underground, hydrostatic testing, or flow testing that may be required.
D. This contractor shall make all the required tests to the sprinkler system as required by code. He shall be responsible to assure that the Contractor Test Certificates for the overhead, backflow and underground work are completed and delivered to the owner’s insurance underwriter to assure proper insurance credit.
E. All tests requiring the witnessing by local authorities will be the responsibility of this contractor. If tests are not run or do not have the proper witness, then they will be run later and all damage caused by the system, or caused in uncovering the system for such test, will be borne by this contractor.

3.17 WARRANTY
A. This contractor shall warranty the sprinkler system and all its components for one year from the date of acceptance by the owner. Any costs incurred to extend any warranties of materials to assure this time frame shall be borne by this contractor.
B. Provide Operation and Maintenance Manuals with correct as-builts test certificates and warranties included. A minimum 6 sets to be provided in red 3-ring binders.
C. Electronic copy of AutoCAD as-built drawings shall also be provided on CD, with each O&M Manual.
3.18 FIELD QUALITY CONTROL

A. Flush, test and inspect sprinkler piping according to NFPA 13, “System Acceptance” Chapter.

B. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.

C. Report test results promptly and in writing to Architect and authorities having jurisdiction.

END OF SECTION
SECTION 22 61 13
COMPRESSED-AIR PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Medical compressed-air piping, designated "medical air."
   2. Gas-powered-tool compressed-air piping, designated "instrument air."
   3. Healthcare laboratory compressed-air piping, designated "instrument air."

B. Related Requirements:
   2. Section 12 35 53 "Laboratory Casework" for compressed-air outlets in laboratory casework.
   3. Section 12 35 70 "Healthcare Casework" for compressed-air outlets in healthcare casework.
   4. Section 22 61 19 "Compressed-Air Equipment for Laboratory and Healthcare Facilities" for air compressors and specialties.
   5. Section 22 64 00 "Medical Gas Alarms" for combined medical air, vacuum, and gas alarms.

1.3 DEFINITIONS
A. Medical compressed-air piping systems include medical air, and, instrument air.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer and testing agency.
B. Seismic Qualification Certificates: For medical compressed-air manifolds, accessories, and components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
C. Material Certificates: Signed by Installer certifying that medical compressed-air piping materials comply with requirements in NFPA 99 for positive-pressure medical gas systems.
D. Brazing certificates.
E. Field quality-control reports.
1.6 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: For compressed-air piping specialties to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS
A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Quick-Coupler Service Connections: Furnish complete noninterchangeable medical compressed-air pressure outlets.
a. Medical Air: Equal to 10 percent of amount installed.
b. Instrument Air: Equal to 10 percent of amount installed.
a. Medical Air D.I.S.S. No. 1160: Equal to 10 percent of amount installed, but no fewer than 10 units.
b. Instrument Air D.I.S.S. No. 1160: Equal to 10 percent of amount installed, but no fewer than 10 units.

1.8 QUALITY ASSURANCE
A. Installer Qualifications:
2. Shape-Memory-Metal Coupling Joints: An authorized representative who is trained and approved by manufacturer.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.
1. Qualify testing personnel according to ASSE Standard #6020 for medical-gas-system inspectors and ASSE Standard #6030 for medical-gas-system verifiers.


PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION
A. Medical air operating at 50 to 55 psig.
B. Instrument air operating at 175 psig.

2.2 PERFORMANCE REQUIREMENTS
A. Seismic Performance: Medical compressed-air manifolds shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and with the requirements specified in Section 22 05 48 Vibration and Seismic Controls for Plumbing Piping and Equipment.
1. The term ”withstand” means ”the manifold will remain in place without separation of any parts when subjected to the seismic forces specified and the manifold will be fully operational after the seismic event.”
2. Component Importance Factor is 1.5.
2.3 **PIPES, TUBES, AND FITTINGS**

A. Comply with NFPA 99 for medical air piping materials.

B. Comply with ASME B31.9, "Building Services Piping," for instrument air piping operating at 150 psig or less.

C. Copper Medical Gas Tube: ASTM B 819, Type K and Type L, seamless, drawn temper, that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in green for Type K tube and in blue for Type L tube.

D. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.

E. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

F. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.
   2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.

G. Shape-Memory-Metal Couplings:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
         a. Aerofit, Inc.
         b. Smart Tap, Inc.
   3. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.

H. Flexible Pipe Connectors:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
         a. Flex-Hose Co., Inc.
         b. Flexicraft Industries.
         c. Hyspan Precision Products, Inc.
         d. Mercer Gasket & Shim, Inc.
         e. Metraflex Company (The).
         f. Proco Products, Inc.
         g. Unaflex.
         h. Universal Metal Hose; a Hyspan Co.
   3. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
      a. Working-Pressure Rating: 200 psig minimum.
      b. End Connections: Plain-end copper tube.

2.4 **JOINING MATERIALS**

A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.

B. Threaded-Joint Tape: PTFE.
2.5 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.

B. Zone-Valve Box Assemblies: Box with medical gas valves, tube extensions, and gages.
   1. Zone-Valve Boxes:
      a. Steel Box with Aluminum Cover:
         1) Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         2) **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
            a) **Allied Healthcare Products Inc.**
            b) **Amico Corporation.**
            c) **Ohio Medical Corporation.**
            d) **BeaconMedaes**
      b. Description: Formed steel box with cover, anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves. Medical air and medical vacuum tubing, valves, and gages may be incorporated in zone valve boxes for medical gases.
         1) Interior Finish: Factory-applied white enamel.
         2) Cover Plate: Aluminum with frangible or removable windows.
         3) Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

C. Ball Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
      a. **Allied Healthcare Products Inc.; Chemetron Division.**
      b. **Amico Corporation.**
      c. **BeaconMedaes.**
      d. **Conbraco Industries, Inc.**
      e. **Marwin Valve; a division of Richards Industries.**
      f. **NIBCO INC.**
      g. **Ohio Medical Corporation.**
      h. **Tri-Tech Medical Inc.**
   4. Description: Three-piece body, brass or bronze.
   5. Pressure Rating: 300 psig minimum.
   7. Seats: PTFE or TFE.
   8. Handle: Lever type with locking device.
   9. Stem: Blowout proof with PTFE or TFE seal.

D. Check Valves:
   1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
      a. **Allied Healthcare Products Inc.; Chemetron Division.**
      b. **Amico Corporation.**
      c. **BeaconMedaes.**
      d. **Conbraco Industries, Inc.**
e. Ohio Medical Corporation.
f. Tri-Tech Medical Inc.

3. Description: In-line pattern, bronze.
4. Pressure Rating: 300 psig minimum.
5. Operation: Spring loaded.

E. Safety Valves:
1. Bronze body.
2. ASME-construction, poppet, pressure-relief type.
3. Settings to match system requirements.

F. Pressure Regulators:
1. Bronze body and trim.
2. Spring-loaded, diaphragm-operated, relieving type.
4. Rated for 250-psig minimum inlet pressure.
5. Capable of controlling delivered air pressure within 0.5 psig for each 10-psig inlet pressure.

2.6 MEDICAL COMPRESSED-AIR SERVICE CONNECTIONS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide Ohmeda compatible outlets by one of the following:
1. Allied Healthcare Products Inc.; Chemetron Division.
2. Amico Corporation.
4. Ohio Medical Corporation.
5. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
6. Tri-Tech Medical Inc.

C. General Requirements for Medical Compressed-Air Service Connections:
1. Suitable for specific medical air pressure and service listed.
2. Include roughing-in assemblies, finishing assemblies, and cover plates.
3. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate.
4. Recessed-type units made for concealed piping unless otherwise indicated.

D. Roughing-in Assembly:
1. Steel outlet box for recessed mounting and concealed piping.
2. Brass-body outlet block with secondary check valve that will prevent gas flow when primary valve is removed.
3. Double seals that will prevent air leakage.
4. ASTM B 819, NPS 3/8 copper outlet tube brazed to valve with service marking and tube-end dust cap.

E. Finishing Assembly:
1. Brass housing with primary check valve.
2. Double seals that will prevent air leakage.
3. Cover plate with gas-service label.

F. Quick-Coupler Pressure Service Connections:
1. Outlets for medical air and instrument air with noninterchangeable keyed indexing to prevent interchange between services.
2. Constructed to permit one-handed connection and removal of equipment.
3. With positive-locking ring that retains equipment stem in valve during use.
G. D.I.S.S. Pressure Service Connections: Outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.

H. Cover Plates:
   1. One piece.
   2. Aluminum or stainless steel.
   3. Permanent, color-coded, identifying label matching corresponding service.

2.7 MEDICAL COMPRESSED-AIR PRESSURE CONTROL PANELS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
   1. Allied Healthcare Products Inc.; Chemetron Division.
   2. Amico Corporation.

C. Description:
   1. Steel box and support brackets for recessed roughing-in with stainless-steel or anodized-aluminum cover plate with printed operating instructions.
   2. Manifold assembly consisting of inlet supply valve, inlet supply pressure gage, line-pressure control regulator, outlet supply pressure gage, D.I.S.S. service connection, and piping outlet for remote service connection.
   5. Pressure Gages: 0 to 300 psig.
   7. Before final assembly, provide temporary dust shield and U-tube for testing.
   8. Label cover plate "Air Pressure Control."

2.8 NITROGEN

A. Comply with USP 32 - NF 27 for oil-free dry nitrogen.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:
   1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
   2. Wash medical gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.
      a. Scrub to ensure complete cleaning.
      b. Rinse with clean, hot water to remove cleaning solution.
3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of compressed-air piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install compressed-air piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

I. Install eccentric reducers, if available, where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

J. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver. Comply with requirements in Section 22 05 19 "Meters and Gages for Plumbing Piping."

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and for branch connections.

O. Install medical air piping to medical air service connections specified in this Section, to medical air service connections in equipment specified in Section 22 63 13 "Gas Piping for Laboratory and Healthcare Facilities," and to equipment specified in other Sections requiring medical air service.

P. Piping Restraint Installation: Install seismic restraints on compressed-air piping. Seismic-restraint devices are specified in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

Q. Install compressed-air service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

R. Connect compressed-air piping to air compressors and to compressed-air outlets and equipment requiring compressed-air service.

S. Install unions in copper compressed-air tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 05 18 “Escutcheons for Plumbing Piping.”

3.3 VALVE INSTALLATION
A. Install shutoff valve at each connection to and from compressed-air equipment and specialties.
B. Install check valves to maintain correct direction of compressed-air flow from compressed-air equipment.
C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.
D. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.
E. Install pressure regulators on compressed-air piping where reduced pressure is required.
F. Install flexible pipe connectors in discharge piping and in inlet air piping from remote air-inlet filter of each air compressor.

3.4 JOINT CONSTRUCTION
A. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.
B. Threaded Joints: Apply appropriate tape to external pipe threads.
C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Continuously purge joint with oil-free dry nitrogen during brazing.
D. Flanged Joints: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.
E. Shape-Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of shape-memory-metal coupling joints.

3.5 COMPRESSED-AIR SERVICE COMPONENT INSTALLATION
A. Install compressed-air pressure control panel in walls. Attach to substrate.

3.6 HANGER AND SUPPORT INSTALLATION
A. Comply with requirements in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.
B. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.
C. Vertical Piping: MSS Type 8 or Type 42, clamps.
D. Individual, Straight, Horizontal Piping Runs:
   1. 100 Feet and Less: MSS Type 1, adjustable, steel, clevis hangers.
   2. Longer Than 100 Feet: MSS Type 43, adjustable, roller hangers.
E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.
F. Base of Vertical Piping: MSS Type 52, spring hangers.
G. Support horizontal piping within 12 inches of each fitting and coupling.
H. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1/4: 60 inches with 3/8-inch rod.
   2. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
   4. NPS 1: 96 inches with 3/8-inch rod.
   6. NPS 1-1/2: 10 feet with 3/8-inch rod.
   7. NPS 2: 11 feet with 3/8-inch rod.
   8. NPS 2-1/2: 13 feet with 1/2-inch rod.
   9. NPS 3: 14 feet with 1/2-inch rod.
  10. NPS 3-1/2: 15 feet with 1/2-inch rod.
   11. NPS 4: 16 feet with 1/2-inch rod.

J. Install supports for vertical copper tubing every 10 feet.

3.7 IDENTIFICATION

A. Install identifying labels and devices for medical compressed-air piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:
   1. Medical Air: Black letters on yellow background.
   2. Instrument Air: White letters on red background.
   3. Medical Laboratory Air: Black letters on yellow-and-white checkerboard background.

3.8 FIELD QUALITY CONTROL FOR MEDICAL COMPRESSED-AIR PIPING IN HEALTHCARE FACILITIES

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections of medical compressed-air piping in healthcare facilities and to prepare test and inspection reports.

B. Tests and Inspections:

1. Medical Compressed-Air Testing Coordination: Perform tests, inspections, verifications, and certification of medical compressed-air piping systems concurrently with tests, inspections, and certification of medical gas piping and medical vacuum piping systems.

2. Preparation: Perform the following Installer tests according to requirements in NFPA 99 and ASSE Standard #6010:
   a. Initial blowdown.
   b. Initial pressure test.
   c. Cross-connection test.
   d. Piping purge test.
   e. Standing pressure test for positive-pressure medical compressed-air piping.
   f. Repair leaks and retest until no leaks exist.

3. System Verification: Perform the following tests and inspections according to NFPA 99, ASSE Standard #6020, and ASSE Standard #6030:
   a. Standing pressure test.
   b. Individual-pressurization or pressure-differential cross-connection test.
   c. Valve test.
   d. Master and area alarm tests.
e. Piping purge test.
f. Piping particulate test.
g. Piping purity test.
h. Final tie-in test.
i. Operational pressure test.
j. Medical air purity test.
k. Verify correct labeling of equipment and components.

4. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:

   a. Inspections performed.
   b. Procedures, materials, and gases used.
   c. Test methods used.
   d. Results of tests.

C. Remove and replace components that do not pass tests and inspections and retest as specified above.

3.9 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, according to "Preparation" Article.

3.10 PIPING SCHEDULE

A. Connect new tubing to existing tubing with memory-metal couplings.

B. Flanges may be used where connection to flanged equipment is required.

C. Medical Air Piping and Instrument Air Piping: Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.

3.11 VALVE SCHEDULE

A. Shutoff Valves: Ball valve with manufacturer-installed ASTM B 819, copper-tube extensions.

B. Zone Valves: Ball valve with manufacturer-installed ASTM B 819, copper-tube extensions with pressure gage on one copper-tube extension.

END OF SECTION
PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Medical-surgical vacuum piping, designated "medical vacuum."
   2. Waste anesthetic gas disposal piping, designated "WAGD."
B. Related Requirements:
   2. Section 12 35 53 "Laboratory Casework" for vacuum inlets in laboratory casework.
   3. Section 12 35 70 "Healthcare Casework" for vacuum inlets in healthcare casework.
   4. Section 22 62 19 "Vacuum Equipment for Laboratory and Healthcare Facilities" for vacuum producers and accessories.
   5. Section 22 64 00 "Medical Gas Alarms" for vacuum piping alarms.

1.3 DEFINITIONS
A. WAGD: Waste anesthetic gas disposal.
B. Medical vacuum piping systems include medical vacuum, WAGD, dental vacuum, HVE, and medical laboratory vacuum piping systems.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer and testing agency.
B. Material Certificates: Signed by Installer certifying that medical vacuum piping materials comply with requirements in NFPA 99.
C. Brazing certificates.
D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: For vacuum piping specialties to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS
A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Quick-Coupler Service Connections: Furnish complete noninterchangeable medical vacuum suction inlets.
      a. Medical Vacuum: Equal to 10 percent of amount installed, but no fewer than 10 units.
      b. WAGD: Equal to 10 percent of amount installed, but no fewer than 10 units.
   a. Medical Vacuum D.I.S.S. No. 1220: Equal to 10 percent of amount installed, but no fewer than 10 units.
   b. WAGD D.I.S.S. No. 2220: Equal to 10 percent of amount installed, but no fewer than 10 units.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:
   2. Shape-Memory-Metal Coupling Joints: An authorized representative who is trained and approved by manufacturer.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.
   1. Qualify testing personnel according to ASSE Standard #6020 for medical-gas-system inspectors and ASSE Standard #6030 for medical-gas-system verifiers.


PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Medical vacuum operating at 15 in. Hg.
B. WAGD operating at 15 in. Hg.

2.2 PIPES, TUBES, AND FITTINGS

A. Comply with NFPA 99 for medical vacuum piping materials.

B. Copper Medical Gas Tube: ASTM B 819, Type L, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in blue.

C. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service.

D. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

E. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.
   1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, full-face type.
   2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.

F. Shape-Memory-Metal Couplings:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
      a. Aerofit, Inc.
b. Smart Tap, Inc.

3. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.

G. Flexible Pipe Connectors:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, product by one of the following:
   a. Flex-Hose Co., Inc.
   b. Flexicraft Industries.
   c. HySpan Precision Products, Inc.
   d. Mercer Gasket & Shim, Inc.
   e. Metraflex Company (The).
   f. Proco Products, Inc.
   g. Unaflex.
   h. Universal Metal Hose; a HySpan Co.

3. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
   a. Working-Pressure Rating: 200 psig minimum.
   b. End Connections: Plain-end copper tube.

2.3 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.

C. Threaded-Joint Tape: PTFE.

2.4 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.
   1. Exception: Factory cleaning and bagging are not required for valves for WAGD service.

B. Zone-Valve Box Assemblies: Box with medical gas valves, tube extensions, and gages.
   1. Zone-Valve Boxes:
      a. Steel Box with Aluminum Cover:
         1) Manufacturers: Subject to compliance with requirements, provide products by one of the following:
            2) Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
               a) Allied Healthcare Products Inc.
               b) Amico Corporation.
               c) Ohio Medical Corporation.
               d) BeaconMedaes
      b. Description: Formed steel box with cover, anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves. Medical air and medical vacuum tubing, valves, and gages may be incorporated in zone valve boxes for medical gases.
         1) Interior Finish: Factory-applied white enamel.
         2) Cover Plate: Aluminum with frangible or removable windows.
         3) Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.
C. Copper-Alloy Ball Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
      a. Allied Healthcare Products Inc.; Chemetron Division.
      b. Amico Corporation.
      c. BeaconMedaes.
      d. Conbraco Industries, Inc.
      e. Marwin Valve; a division of Richards Industries.
      f. NIBCO INC.
      g. Ohio Medical Corporation.
      h. Tri-Tech Medical Inc.
   4. Description: Three-piece body, brass or bronze.
   5. Pressure Rating: 300 psig minimum.
   7. Seats: PTFE or TFE.
   8. Handle: Lever type with locking device.
   9. Stem: Blowout proof with PTFE or TFE seal.
   10. Ends: manufacturer-installed ASTM B 819, copper-tube extensions with pressure gage on one copper-tube extension.

D. Check Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
      a. Allied Healthcare Products Inc.; Chemetron Division.
      b. Amico Corporation.
      c. BeaconMedaes.
      d. Conbraco Industries, Inc.
      e. Ohio Medical Corporation.
      f. Tri-Tech Medical Inc.
   3. Description: In-line pattern, bronze.
   4. Pressure Rating: 300 psig minimum.
   5. Operation: Spring loaded.

2.5 MEDICAL VACUUM SERVICE CONNECTIONS

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

B. **Basis-of-Design Product:** Subject to compliance with requirements, provide **Ohmeda compatible** product by one of the following:
   1. Allied Healthcare Products Inc.; Chemetron Division.
   2. Amico Corporation.
   4. Ohio Medical Corporation.
   5. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
   6. Tri-Tech Medical Inc.

C. General Requirements for Medical Vacuum Service Connections:
   1. Suitable for specific medical vacuum service listed.
   2. Include roughing-in assemblies, finishing assemblies, and cover plates.
3. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate.
4. Recessed-type units made for concealed piping unless otherwise indicated.

D. Roughing-in Assembly:
1. Steel outlet box for recessed mounting and concealed piping.
2. Brass-body inlet block.
3. Seals that will prevent vacuum leakage.
4. ASTM B 819, NPS 3/8 copper outlet tube brazed to valve with service marking and tube-end dust cap.

E. Finishing Assembly:
1. Brass housing with primary check valve.
2. Seals that will prevent vacuum leakage.
3. Cover plate with gas-service label.

F. Quick-Coupler Suction Service Connections:
1. Inlets for medical vacuum and WAGD with noninterchangeable keyed indexing to prevent interchange between services.
2. Constructed to permit one-handed connection and removal of equipment.
3. With positive-locking ring that retains equipment stem in valve during use.

G. D.I.S.S. Suction Service Connections:
1. Inlets complying with CGA V-5.
2. Threaded indexing to prevent interchange between services.
3. Constructed to permit one-handed connection and removal of equipment.

H. Vacuum Bottle Brackets: One piece, with pattern and finish matching corresponding service cover plate.

I. Cover Plates:
1. One piece.
2. Aluminum or stainless steel.
3. Permanent, color-coded, identifying label matching corresponding service.

2.6 NITROGEN

A. Comply with USP 32 - NF 27 for oil-free dry nitrogen.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:
1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
2. Wash medical gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.
   a. Scrub to ensure complete cleaning.
   b. Rinse with clean, hot water to remove cleaning solution.
3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of vacuum piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, vacuum producer sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of vacuum piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install vacuum piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than piping pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

I. Install eccentric reducers, if available, where vacuum piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

J. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install thermometer and vacuum gage on inlet piping to each vacuum producer and on each receiver and separator. Comply with requirements in Section 22 05 19 "Meters and Gages for Plumbing Piping."

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and for branch connections. Extruded-tee branch outlets in copper tubing may be made where specified.

O. Install medical vacuum piping from medical vacuum service connections specified in this Section, to equipment specified in Section 22 62 19 "Vacuum Equipment for Laboratory and Healthcare Facilities," and to equipment specified in other Sections requiring medical vacuum service.

P. Piping Restraint Installation: Install seismic restraints on vacuum piping. Seismic-restraint devices are specified in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

Q. Install medical vacuum service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

R. Install medical vacuum bottle bracket adjacent to each wall-mounted medical vacuum service connection suction inlet.

S. Connect vacuum piping to vacuum producers and to equipment requiring vacuum service.

T. Install unions in copper vacuum tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 05 18 "Escutcheons for Plumbing Piping."

3.3 VALVE INSTALLATION
A. Install shutoff valve at each connection to and from vacuum equipment and specialties.
B. Install check valves to maintain correct direction of vacuum flow to vacuum-producing equipment.
C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.
D. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.
E. Install flexible pipe connectors in suction inlet piping to each vacuum producer.

3.4 JOINT CONSTRUCTION
A. Ream ends of pipes and tubes and remove burrs.
B. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.
C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
D. Threaded Joints: Apply appropriate tape to external pipe threads.
E. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Do not use flux. Continuously purge joint with oil-free dry nitrogen during brazing.
F. Flanged Joints:
1. Copper Tubing: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.
2. PVC Piping: Install PVC flange on PVC pipes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.
G. Shape-Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of shape-memory-metal coupling joints.

3.5 HANGER AND SUPPORT INSTALLATION
A. Comply with requirements in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.
B. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.
C. Vertical Piping: MSS Type 8 or Type 42, clamps.
D. Individual, Straight, Horizontal Piping Runs:
1. 100 Feet and Less: MSS Type 1, adjustable, steel, clevis hangers.
2. Longer Than 100 Feet: MSS Type 43, adjustable, roller hangers.
E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.
F. Base of Vertical Piping: MSS Type 52, spring hangers.
G. Support horizontal piping within 12 inches of each fitting and coupling.
H. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1/4: 60 inches with 3/8-inch rod.
   2. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
   4. NPS 1: 96 inches with 3/8-inch rod.
   6. NPS 1-1/2: 10 feet with 3/8-inch rod.
   7. NPS 2: 11 feet with 3/8-inch rod.
   8. NPS 2-1/2: 13 feet with 1/2-inch rod.
   9. NPS 3: 14 feet with 1/2-inch rod.
   10. NPS 3-1/2: 15 feet with 1/2-inch rod.
   11. NPS 4: 16 feet with 1/2-inch rod.
   12. NPS 6: 20 feet with 5/8-inch rod.

J. Install supports for vertical copper tubing every 10 feet.

3.6 IDENTIFICATION

A. Install identifying labels and devices for laboratory vacuum piping, valves, and specialties. Comply with requirements in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

B. Install identifying labels and devices for medical vacuum piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:
   1. Medical Vacuum: Black letters on white background.
   2. WAGD: White letters on violet background.

3.7 FIELD QUALITY CONTROL FOR HEALTHCARE FACILITY MEDICAL VACUUM PIPING

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections of medical vacuum piping systems in healthcare facilities and to prepare test and inspection reports.

B. Tests and Inspections:
   1. Medical Vacuum Testing Coordination: Perform tests, inspections, verifications, and certification of medical vacuum piping systems concurrently with tests, inspections, and certification of medical compressed-air piping and medical gas piping systems.
   2. Preparation: Perform the following Installer tests according to requirements in NFPA 99 and ASSE Standard #6010:
      a. Initial blowdown.
      b. Initial pressure test.
      c. Cross-connection test.
      d. Piping purge test.
      e. Standing pressure test for vacuum systems.
      f. Repair leaks and retest until no leaks exist.
   3. System Verification: Perform the following tests and inspections according to NFPA 99, ASSE Standard #6020, and ASSE Standard #6030:
      a. Standing pressure test.
      b. Individual-pressurization or pressure-differential cross-connection test.
      c. Valve test.
      d. Master and area alarm tests.
      e. Piping purge test.
      f. Final tie-in test.
      g. Operational vacuum test.
      h. Verify correct labeling of equipment and components.
4. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:
   a. Inspections performed.
   b. Procedures, materials, and gases used.
   c. Test methods used.
   d. Results of tests.

C. Remove and replace components that do not pass tests and inspections and retest as specified above.

3.8 FIELD QUALITY CONTROL FOR LABORATORY FACILITY NONMEDICAL VACUUM PIPING

A. Testing Agency: Engage qualified testing agency to perform field tests and inspections of vacuum piping in nonmedical laboratory facilities and to prepare test and inspection reports.

B. Tests and Inspections:
   1. Piping Leak Tests for Vacuum Piping: Test new and modified parts of existing piping.
      Cap and fill vacuum piping with oil-free, dry nitrogen. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
      a. Test Pressure for Copper Tubing: 100 psig.
   2. Repair leaks and retest until no leaks exist.
   3. Inspect filters for proper operation.

C. Remove and replace components that do not pass tests and inspections and retest as specified above.

3.9 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, according to "Preparation" Article.

3.10 PIPING SCHEDULE

A. Connect new copper tubing to existing copper tubing with memory-metal couplings.

B. Flanges may be used where connection to flanged equipment is required.

C. Medical Vacuum Piping: Use copper medical gas tube, wrought-copper fittings, and brazed joints.

D. WAGD Piping: Use copper medical gas tube, wrought-copper fittings, and brazed joints.

3.11 VALVE SCHEDULE

A. Shutoff Valves:
   1. Copper Tubing: Copper-alloy ball valve with manufacturer-installed ASTM B 819, copper-tube extensions.

B. Zone Valves: Copper-alloy ball valve with manufacturer-installed ASTM B 819, copper-tube extensions with pressure gage on one copper-tube extension.

END OF SECTION
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SECTION 22 63 13
GAS PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

PART I - GENERAL

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

1.2 SUMMARY
A. Section Includes:
   1. Carbon dioxide piping, designated "medical carbon dioxide."
   2. Nitrogen piping, designated "medical nitrogen."
   3. Nitrous oxide piping, designated "medical nitrous oxide."
   4. Oxygen piping, designated "medical oxygen."
B. Owner-Furnished Material:
   1. Medical gas manifolds.
C. Related Requirements:
   2. Section 12 35 53 "Laboratory Casework" for gas outlets in casework.
   4. Section 22 64 00 "Medical Gas Alarms" for combined medical air, vacuum, and gas alarms.

1.3 DEFINITIONS
A. CR: Chlorosulfonated polyethylene synthetic rubber.
B. Medical gas piping systems include medical carbon dioxide, medical nitrogen, medical nitrous oxide, and medical oxygen for healthcare facility patient care.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer and testing agency.
B. Seismic Qualification Certificates: For gas manifolds and bulk gas storage tanks, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
C. Material Certificates: Signed by Installer certifying that medical gas piping materials comply with requirements in NFPA 99 for positive-pressure medical gas systems.
D. Brazing certificates.
E. Certificates of Shop Inspection and Data Report for Bulk Gas Storage Tanks: As required by ASME Boiler and Pressure Vessel Code.

F. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For medical and specialty gas piping specialties to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Quick-Coupler Service Connections: Furnish complete noninterchangeable medical gas pressure outlets and suction inlets.
      a. Medical Carbon Dioxide: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      b. Medical Nitrous Oxide: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      c. Medical Oxygen: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      d. Medical Air: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      e. Instrument Air: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      f. Medical Vacuum: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      g. WAGD: Equal to 10 percent of quantity installed, but no fewer than 10 units.

      a. Medical Carbon Dioxide D.I.S.S. No. 1080: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      b. Medical Nitrogen D.I.S.S. No. 1120: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      c. Medical Nitrous Oxide D.I.S.S. No. 1040: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      d. Medical Oxygen D.I.S.S. No. 1240: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      e. Medical Air D.I.S.S. No. 1160: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      f. Instrument Air D.I.S.S. No. 1160: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      g. Medical Vacuum D.I.S.S. No. 1220: Equal to 10 percent of quantity installed, but no fewer than 10 units.
      h. WAGD D.I.S.S. No. 2220: Equal to 10 percent of quantity installed, but no fewer than 10 units.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:
   3. Shape-Memory-Metal Coupling Joints: An authorized representative who is trained and approved by manufacturer.
B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the medical gas piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.
   1. Qualify testing personnel according to ASSE Standard #6020 for medical-gas-system inspectors and ASSE Standard #6030 for medical-gas-system verifiers.

C. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications"; or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Medical carbon dioxide operating at 50 to 55 psig.
B. Medical helium operating at 50 to 55 psig.
C. Medical nitrogen operating at 160 to 185 psig.
D. Medical nitrous oxide operating at 50 to 55 psig.
E. Medical oxygen operating at 50 to 55 psig.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Medical gas manifolds shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the medical gas manifolds will remain in place without separation of any parts when subjected to the seismic forces specified and the manifolds and tanks will be fully operational after the seismic event."
   2. Component Importance Factor is 1.5.

2.3 PIPES, TUBES, AND FITTINGS

A. Comply with NFPA 99 for medical gas piping materials.
B. Copper Medical Gas Tube: ASTM B 819, Type K and Type L, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service; or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in green for Type K tube and blue for Type L tube.
C. Wrought-Copper Fittings: ASME B16.22, solder-join pressure type that has been manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.
D. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.
E. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.
   1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, full-face type.
   2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.
F. Shape-Memory-Metal Couplings:
   1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
      a. Aerofit, Inc.
      b. Smart Tap, Inc.
3. Description: Cryogenic compression fitting made of nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.

2.4 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.

B. Threaded-Joint Tape: PTFE.


2.5 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.

B. Zone-Valve Box Assemblies: Box with medical gas valves, tube extensions, and gages.
   1. Zone-Valve Boxes:
      a. Steel Box with Aluminum Cover:
         1) Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         2) Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
            a) Allied Healthcare Products Inc.
            b) Medical Technology Associates, Inc
            c) Amico Corporation.
            d) Ohio Medical Corporation.
      b. Description: Formed steel box with cover, anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves. Medical air and medical vacuum tubing, valves, and gages may be incorporated in zone valve boxes for medical gases.
         1) Interior Finish: Factory-applied white enamel.
         2) Cover Plate: Aluminum with frangible or removable windows.
         3) Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

C. Ball Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
      a. Allied Healthcare Products Inc.; Chemetron Division.
      b. Medical Technology Associates, Inc.
      c. Amico Corporation.
      d. BeaconMedaes.
      e. Conbraco Industries, Inc.
      f. Marwin Valve; a division of Richards Industries.
      g. NIBCO INC.
      h. Ohio Medical Corporation.
      i. Tri-Tech Medical Inc.
   4. Description: Three-piece body, brass or bronze.
   5. Pressure Rating: 300 psig minimum.
   7. Seats: PTFE or TFE.
8. Handle: Lever [type with locking device].
9. Stem: Blowout proof with PTFE or TFE seal.

D. Check Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
   a. Allied Healthcare Products Inc.; Chemetron Division.
   b. Medical Technology Associates, Inc.
   c. Amico Corporation.
   d. BeaconMedsaes.
   e. Conbraco Industries, Inc.
   f. Ohio Medical Corporation.
   g. Tri-Tech Medical Inc.
3. Description: In-line pattern, bronze.
4. Pressure Rating: 300 psig minimum.
5. Operation: Spring loaded.

E. Emergency Oxygen Connections: Low-pressure oxygen inlet assembly for connection to building oxygen piping systems.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. **Basis-of-Design Product:** Subject to compliance with requirements, provide product by one of the following:
   a. Allied Healthcare Products Inc.; Chemetron Division.
   b. Medical Technology Associates, Inc.
   c. Amico Corporation.
   d. BeaconMedsaes.
   e. Conbraco Industries, Inc.
   f. Ohio Medical Corporation.
   g. Tri-Tech Medical Inc.
3. Enclosure: Weatherproof hinged locking cover with caption similar to "Emergency Low-Pressure Gaseous Oxygen Inlet."
4. Inlet: Manufacturer-installed, NPS 1 or NPS 1-1/4, ASTM B 819, copper tubing with NPS 1 minimum ball valve.
5. Safety Valve: Bronze-body pressure relief valve set at 75 or 80 psig.
6. Instrumentation: Pressure gage.

F. Safety Valves:
1. Bronze body.
2. ASME-construction, poppet, pressure-relief type.
3. Settings to match system requirements.

G. Pressure Regulators:
1. Bronze body and trim.
2. Spring-loaded, diaphragm-operated, relieving type.
4. Rated for 250-psig minimum inlet pressure.
5. Capable of controlling delivered gas pressure within 0.5 psig for each 10-psig inlet pressure.

2.6 **MEDICAL GAS SERVICE CONNECTIONS**

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
B. **Basis-of-Design Product:** Subject to compliance with requirements, provide **Ohmeda Compatible** product by one of the following:
1. Allied Healthcare Products Inc.; Chemetron Division.
2. Medical Technology Associates, Inc
3. Amico Corporation.
5. Ohio Medical Corporation.
6. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
7. Tri-Tech Medical Inc.

C. **General Requirements for Medical Gas Service Connections:**
1. Suitable for specific medical gas pressure and suction service listed.
2. Include roughing-in assemblies, finishing assemblies, and cover plates.
3. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate.
4. Recessed-type units made for concealed piping unless otherwise indicated.

D. **Roughing-in Assembly:**
1. Steel outlet box for recessed mounting and concealed piping.
2. Brass-body outlet block with secondary check valve that will prevent gas flow when primary valve is removed. Suction inlets to be without secondary valve.
3. Double seals that will prevent gas leakage.
4. ASTM B 819, NPS 3/8 copper outlet tube brazed to valve with service marking and tube-end dust cap.

E. **Finishing Assembly:**
1. Brass housing with primary check valve.
2. Double seals that will prevent gas leakage.
3. Cover plate with gas-service label.

F. **Quick-Coupler Pressure Service Connections:** Outlets for carbon dioxide nitrous oxide and oxygen with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment, and with positive-locking ring that retains equipment stem in valve during use.

G. **Quick-Coupler Pressure Service Connections:** Outlets for instrument air with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment, and with positive-locking ring that retains equipment stem in valve during use.

H. **Quick-Coupler Suction Service Connections:** Inlets for medical vacuum with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment, and with positive-locking ring that retains equipment stem in valve during use.

I. **D.I.S.S. Pressure Service Connections:** Outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.
1. Medical Carbon Dioxide: D.I.S.S. No. 1080.

J. **D.I.S.S. Pressure Service Connections:** Outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.
K. D.I.S.S. Suction Service Connections: Inlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.
   2. WAGD: D.I.S.S. No. 2220.

L. Cover Plates: One piece, aluminum or stainless steel and permanent, color-coded, identifying label matching corresponding service.

2.7 MEDICAL NITROGEN PRESSURE CONTROL PANELS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
   1. Allied Healthcare Products Inc.; Chemetron Division.
   2. Medical Technology Associates, Inc
   3. Amico Corporation.
   4. BeaconMedical.
   5. Ohio Medical Corporation.
   6. Tri-Tech Medical Inc.

C. Description:
   1. Steel box and support brackets for recessed roughing-in with stainless-steel or anodized-aluminum cover plate with printed operating instructions.
   2. Manifold assembly consisting of inlet supply valve, inlet supply pressure gauge, line-pressure control regulator, outlet supply pressure gauge, D.I.S.S. service connection, and piping outlet for remote service connection.
   5. Pressure Gages: 0 to 300 psig.
   7. Before final assembly, provide temporary dust shield and U-tube for testing.
   8. Label cover plate "Nitrogen Pressure Control."

2.8 MEDICAL GAS MANIFOLDS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
   1. Acme Cryogenics.
   2. Medical Technology Associates, Inc
   3. Allied Healthcare Products Inc.; Chemetron Division.
   5. BeaconMedical.
   6. Ohio Medical Corporation.
   7. Tri-Tech Medical Inc.

C. Comply with NFPA 99 for high-pressure medical gas cylinders.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Central Control-Panel Unit:
   1. Supply and delivery pressure gages.
2. Electrical alarm-system connections and transformer.
3. Indicator lights or devices.
4. Manifold connection.
5. Pressure changeover switch.
7. Shutoff valves.
8. Safety valve.

F. Manifold and Headers:
   1. Duplex, nonferrous-metal header for number of cylinders indicated, divided into two equal banks.
   2. Designed for 2000-psig minimum inlet pressure except nitrous oxide manifolds may be designed for 800 psig and carbon dioxide manifolds may be designed for 1500 psig.
   3. Cylinder-bank headers with inlet (pigtail) connections complying with CGA V-1.
   4. Individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gage.

G. Operation: Automatic, pressure-switch-activated changeover from one cylinder bank to the other when first bank becomes exhausted, without line-pressure fluctuation or resetting of regulators and without supply interruption by shutoff of either cylinder-bank header.

H. Mounting: Wall with mounting brackets for manifold control cabinet and headers.

I. Label manifold control unit with permanent label identifying medical gas type and system operating pressure.

2.9 GAS CYLINDER STORAGE RACKS

A. Wall Storage Racks: Fabricate racks with chain restraints for upright cylinders as indicated or provide equivalent manufactured wall racks.

B. Freestanding Storage Racks: Fabricate racks as indicated or provide equivalent manufactured storage racks.

2.10 NITROGEN

A. Comply with USP 32 - NF 27 for oil-free dry nitrogen.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:
   1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
   2. Wash medical gas tube and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.
      a. Scrub to ensure complete cleaning.
      b. Rinse with clean, hot water to remove cleaning solution.

3.2 EARTHWORK

A. Comply with requirements in Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling and for underground warning tapes.
3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of gas piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of medical gas piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications specified in “Piping Schedule” Article unless otherwise indicated.

H. Install piping to permit valve servicing.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and for branch connections.

K. Install medical gas piping to medical gas service connections specified in this Section, to medical gas service connections in equipment specified in this Section, and to equipment specified in other Sections requiring medical gas service.

L. Install exterior, buried medical gas piping in protective conduit fabricated with PVC pipe and fittings. Do not extend conduit through foundation wall.

M. Piping Restraint Installation: Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 22 05 48 “Vibration and Seismic Controls for Plumbing Piping and Equipment.”

N. Install medical gas service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.

O. Connect gas piping to gas sources and to gas outlets and equipment requiring gas service.

P. Install unions in copper tubing adjacent to each valve and at final connection to each specialty and piece of equipment.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 05 18 "Escutcheons for Plumbing Piping."

3.4 VALVE INSTALLATION

A. Install shutoff valve at each connection to gas laboratory and healthcare equipment and specialties.
B. Install check valves to maintain correct direction of gas flow from laboratory and healthcare gas supplies.

C. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.

D. Install zone valves and gages in valve boxes. Arrange valves so largest valve is lowest. Rotate valves to angle that prevents closure of cover when valve is in closed position.

E. Install pressure regulators on gas piping where reduced pressure is required.

F. Install emergency oxygen connection with pressure relief valve and full-size discharge piping to outside, with check valve downstream from pressure relief valve, and with ball valve and check valve in supply main from bulk oxygen storage tank.

3.5 JOINT CONSTRUCTION

A. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.

B. Threaded Joints: Apply appropriate tape to external pipe threads.

C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Continuously purge joint with oil-free, dry nitrogen during brazing.

D. Shape-Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of shape-memory-metal coupling joints.

3.6 GAS SERVICE COMPONENT INSTALLATION

A. Assemble patient-service console with service connections. Install with supplies concealed in walls. Attach console box or mounting bracket to substrate.

B. Install nitrogen pressure-control panels in walls. Attach to substrate.

C. Install gas manifolds anchored to substrate.

D. Install gas cylinders and connect to manifold piping.

E. Install gas manifolds with seismic restraints.

3.7 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

B. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

C. Vertical Piping: MSS Type 8 or Type 42, clamps.

D. Individual, Straight, Horizontal Piping Runs:
   1. 100 Feet and Less: MSS Type 1, adjustable, steel, clevis hangers.
   2. Longer Than 100 Feet: MSS Type 43, adjustable, roller hangers.

E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

F. Base of Vertical Piping: MSS Type 52, spring hangers.

G. Support horizontal piping within 12 inches of each fitting and coupling.

H. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch- minimum rods.
I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1/4: 60 inches with 3/8-inch rod.
2. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
4. NPS 1: 96 inches with 3/8-inch rod.
6. NPS 1-1/2: 10 feet with 3/8-inch rod.
7. NPS 2: 11 feet with 3/8-inch rod.
8. NPS 2-1/2: 13 feet with 1/2-inch rod.
9. NPS 3: 14 feet with 1/2-inch rod.
10. NPS 3-1/2: 15 feet with 1/2-inch rod.
11. NPS 4: 16 feet with 1/2-inch rod.
12. NPS 6: 20 feet with 5/8-inch rod.

J. Install supports for vertical copper tubing every 10 feet.

3.8 IDENTIFICATION

A. Install identifying labels and devices for specialty gas piping, valves, and specialties. Comply with requirements in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

B. Install identifying labels and devices for healthcare medical gas piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Carbon Dioxide: Black or white letters on gray background.
4. Oxygen: White letters on green background or green letters on white background.

3.9 FIELD QUALITY CONTROL FOR HEALTHCARE FACILITY MEDICAL GAS

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Medical Gas Piping Testing Coordination: Perform tests, inspections, verifications, and certification of medical gas piping systems concurrently with tests, inspections, and certification of medical compressed-air piping and medical vacuum piping systems.

2. Preparation: Perform the following Installer tests according to requirements in NFPA 99 and ASSE Standard #6010:

   a. Initial blowdown.
   b. Initial pressure test.
   c. Cross-connection test.
   d. Piping purge test.
   e. Standing pressure test for positive-pressure medical gas piping.
   f. Standing pressure test for vacuum systems.
   g. Repair leaks and retest until no leaks exist.

3. System Verification: Perform the following tests and inspections according to NFPA 99, ASSE Standard #6020, and ASSE Standard #6030:

   a. Standing pressure test.
   b. Individual-pressurization or pressure-differential cross-connection test.
   c. Valve test.
   d. Master and area alarm tests.
   e. Piping purge test.
   f. Piping particulate test.
   g. Piping purity test.
   h. Final tie-in test.
   i. Operational pressure test.
j. Medical gas concentration test.
k. Medical air purity test.
l. Verify correct labeling of equipment and components.
m. Verify medical gas supply sources.

4. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:
   a. Inspections performed.
   b. Procedures, materials, and gases used.
   c. Test methods used.
   d. Results of tests.

C. Remove and replace components that do not pass tests and inspections and retest as specified above.

D. Prepare test and inspection reports.

3.10 FIELD QUALITY CONTROL FOR LABORATORY FACILITY SPECIALTY GAS

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:
   1. Piping Leak Tests for Specialty Gas Piping: Test new and modified parts of existing piping. Cap and fill specialty gas piping with oil-free, dry nitrogen to pressure of 50 psig above system operating pressure, but not less than 150 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
   2. Repair leaks and retest until no leaks exist.
   3. Inspect specialty gas regulators for proper operation.

C. Remove and replace components that do not pass tests and inspections and retest as specified above.

D. Prepare test and inspection reports.

3.11 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, according to "Preparation" Article.

3.12 DEMONSTRATION

A. Engage factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain bulk gas storage tanks.

3.13 PIPING SCHEDULE

A. Connect new tubing to existing tubing with memory-metal couplings.

3.14 VALVE SCHEDULE

A. Shutoff Valves: Ball valve with manufacturer-installed ASTM B 819, copper-tube extensions.

B. Zone Valves: Ball valve with manufacturer-installed ASTM B 819, copper-tube extensions with pressure gage on one copper-tube extension.

END OF SECTION
SECTION 23 25 13
WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes the following water treatment for closed-loop hydronic systems:
   2. Automatic chemical-feed equipment.
   3. Chemicals.

B. Related Requirements:
   1. Section 23 25 16 “Water Treatment for Open-Loop Hydronic Systems

1.3 DEFINITIONS
A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

B. RO: Reverse osmosis.

C. TSS: Total suspended solids are solid materials, including organic and inorganic, that are suspended in the water. These solids may include silt, plankton, and industrial wastes.

1.4 ACTION SUBMITTALS
A. Product Data: Include rated capacities, operating characteristics, and furnished specialties and accessories for the following products:
   1. Bypass feeders.
   2. Water meters.
   3. Chemical solution tanks.
   4. Chemical material safety data sheets.

B. Shop Drawings: Pretreatment and chemical treatment equipment showing tanks, maintenance space required, and piping connections to hydronic systems.
   1. Include plans, elevations, sections, and attachment details.
   2. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS
A. Seismic Qualification Certificates: For components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Water Analysis Provider Qualifications: Verification of experience and capability of HVAC water-treatment service provider.

C. Field quality-control reports.

D. Other Informational Submittals:
1. Water-Treatment Program: Written sequence of operation on an annual basis for the application equipment required to achieve water quality defined in "Performance Requirements" Article.

1.6 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: For sensors, injection pumps, and controllers to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE
A. HVAC Water-Treatment Service Provider Qualifications: An experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.

1.8 MAINTENANCE SERVICE
A. Scope of Maintenance Service: Provide chemicals and service program to maintain water conditions required above to inhibit corrosion and scale formation for hydronic piping and equipment. Services and chemicals shall be provided for a period of one year from date of Substantial Completion and shall include the following:
1. Initial water analysis and HVAC water-treatment recommendations.
2. Startup assistance for Contractor to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.
4. Laboratory technical analysis.
5. Analyses and reports of all chemical items concerning safety and compliance with government regulations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Basis-of-Design Product: Subject to compliance with requirements, provide West, Inc.

2.2 PERFORMANCE REQUIREMENTS
A. Water quality for hydronic systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of hydronic equipment without creating a hazard to operating personnel or the environment.
B. Base HVAC water treatment on quality of water available at Project site, hydronic system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.
C. Closed hydronic systems, including:
1. Hot-water heating
2. Chilled water
3. Glycol heating
D. Closed hydronic systems, shall have the following water qualities:
1. pH: Maintain a value within the combined recommendations of the various equipment manufacturers.
2. Nitrite: Maintain a value within 800 to 1000 ppm.
3. Microbiological Limits:
   a. Total Aerobic Plate Count: Maintain a maximum value of zero organisms/mL.
2.3 MANUAL CHEMICAL- FEED EQUIPMENT

A. Bypass Feeders: Steel, with corrosion-resistant exterior coating, minimum 3-1/2-inch fill opening in the top, and NPS 3/4 bottom inlet and top side outlet. Quarter turn or threaded fill cap with gasket seal and diaphragm to lock the top on the feeder when exposed to system pressure in the vessel.
  1. Capacity:
     a. 5 gal.
  2. Minimum Working Pressure:
     a. 125 psig

2.4 CHEMICALS

A. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment and that can attain water quality specified in "Performance Requirements" Article.

2.5 GLYCOL FEED SYSTEM

A. One (1) 50-gallon polyethylene feed tank. Wall thickness shall be a minimum of ¼”. Tank shall be mounted on a steel frame with accommodations for mounting a pump underneath. Tank shall be supplied with a removable lid and all interconnecting piping to pump including strainer and isolation valve. Tank height including stand shall not exceed 48”. Tank stand shall be finished with an epoxy powder coating to protect against corrosion.

B. One (1) Level switch to deactivate pump and activate alarm on low glycol level in the feed tank.

C. One (1) Control panel shall house switching device for pump, audible alarm, HOA switch for pump, lights to indicate power and low level, pushbutton for alarm silence. Enclosure shall be NEMA 12. Control panel shall be mounted on the tank stand.

D. One (1) 1/3 HP centrifugal pump mounted under the feed tank. Materials of construction shall be bronze. Pump shall provide 2.5 GPM at 60 PSIG. Rotary gear pump is not acceptable.

E. Pressure switch shall be Honeywell L404F1078 or Square D 9012 GNG-4. One (1) Pressure switch set at:
   1. Field determine PSIG to activate the glycol feed pump.
   2. Field determine PSI for differential setting for the pressure switch.

F. GLYCOL
   1. The glycol provided shall be propylene glycol as manufactured by Dow Chemical or Huntsman Chemical. Trade name shall be DowFrost HD or JeffCool HD. The water quality in the hot/chilled water system shall meet the recommendations of the glycol manufacturer so as to reduce the formation of sludge. If the water quality at the jobsite does not meet manufacturers recommendations then the glycol solution shall be provided pre-mixed with deionized water. An analysis of the glycol solution and the water quality shall be included in the O&M manuals. Glycol percentage shall be:
      a. 30 % by volume.

PART 3 - EXECUTION

3.1 WATER ANALYSIS

A. Perform an analysis of supply water to determine quality of water available at Project site.
3.2 INSTALLATION

A. Install chemical application equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor chemical tanks and floor-mounting accessories to substrate.

B. Install seismic restraints for equipment and floor-mounting accessories and anchor to building structure. Comply with requirements in Section 23 05 48 "Vibration and Seismic Controls for HVAC" for seismic restraints.

C. Install water testing equipment on wall near water chemical application equipment.

D. Install glycol feed system per manufacturer's recommendations.

E. Install interconnecting control wiring for chemical treatment controls and sensors.

F. Mount sensors and injectors in piping circuits.

G. Bypass Feeders: Install in closed hydronic systems, including:
   1. Hot-water heating
   2. Chilled water

H. Bypass Feeders: Install in closed hydronic systems, and equipped with the following:
   1. Install bypass feeder in a bypass circuit around circulating pumps unless otherwise indicated on Drawings.
   2. Install water meter in makeup-water supply.
   3. Install test-coupon assembly in bypass circuit around circulating pumps unless otherwise indicated on Drawings.
   4. Install a gate or full-port ball isolation valves on inlet, outlet, and drain below the feeder inlet.
   5. Install a swing check on the inlet after the isolation valve.

3.3 CONNECTIONS

A. Where installing piping adjacent to equipment, allow space for service and maintenance.

B. Make piping connections between HVAC water-treatment equipment and dissimilar-metal piping with dielectric fittings. Comply with requirements in Section 23 21 16 "Hydronic Piping Specialties."

C. Install shutoff valves on HVAC water-treatment equipment inlet and outlet. Metal general-duty valves are specified in Section 23 05 23 "General-Duty Valves for HVAC Piping."

D. Comply with requirements in Section 22 11 19 "Domestic Water Piping Specialties" for backflow preventers required in makeup-water connections to potable-water systems.

E. Confirm applicable electrical requirements in electrical Sections for connecting electrical equipment.

F. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

G. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
1. Inspect field-assembled components and equipment installation, including piping and electrical connections.
2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before introducing chemicals for water-treatment system.
3. Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of hydronic systems' startup procedures.
4. Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
5. Test for leaks and defects. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
6. Leave uncovered and unconcealed new, altered, extended, and replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
7. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test pressure to stand for four hours. Leaks and loss in test pressure constitute defects.
8. Repair leaks and defects with new materials and retest piping until no leaks exist.

C. Equipment will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. At quarterly intervals following Substantial Completion, perform separate water analyses on hydronic systems to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section. Submit written reports of water analysis advising Owner of changes necessary to adhere to "Performance Requirements" Article.

F. Comply with ASTM D 3370 and with the following standards:

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC water-treatment systems and equipment.

B. Training: Provide a "how-to-use" self-contained breathing apparatus video that details exact operating procedures of equipment.

END OF SECTION
PART 1 - GENERAL

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

1.2 SUMMARY
A. This section includes an extension of an existing PC based and managed access control and security system (Continental Access) and specifies sensors, signal equipment, and system controls.
B. The electrified locking and access hardware for this project is specified using BEST products that will require the security contractor to provide integrated access control connection locking devices and wire harnesses.

1.3 DEFINITIONS
A. Hard-Wired System: Alarm, supervisory, and detection devices are directly connected, through individual dedicated conductors, to central control panels.

1.4 SYSTEM DESCRIPTION
A. The system shall have both access controlled doors and alarm inputs for intrusion detection.
B. The system shall support automatic responses to alarms entering the system. Each alarm condition shall be capable of initiating numerous events including but not limited to: Activation of remote devices, door control, remote annunciation LED’s, and card validation.
C. Access control functions shall include but not be limited to: Validation based on time of day and day of week, holiday scheduling with card validation override, and access validation based on positive verification of card.
D. The system shall interface with the fire alarm system and in the event of an alarm, shall release all controlled doors designated for emergency egress, and put them in fail-safe mode allowing free egress.

1.5 FUNCTIONAL PERFORMANCE
A. The system shall consist of a network controller and network nodes using a standard TCP/IP network. Each controller shall retain all data necessary for system operation in its own RAM. Each controller will contain an integrated real time clock that continues to govern events even if communication with the main network controller is interrupted.
B. The network controller shall act as an interface point with the node network, a data base management tool, and a transaction storage device.

1.6 ACTION SUBMITTALS
A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections
B. Product data for system components, including "Nationally Recognized Testing Laboratory" (NRTL) listing data and list of materials, dimensioned plans, sections, and elevations showing minimum clearances, mounting arrangements, and installed features and devices.
C. Wiring Diagrams and Door Elevations: Provide the following for each opening having electric hardware, except doors with only magnetic holder/release units.
1. Wiring diagrams for scheduled items requiring power. Identify manufacturer-installed and field-installed wiring.

2. Provide load calculations and requirements for each electro-mechanical locking device within +/-5% of 24 VDC. Size the conductors for each device appropriately to maintain this requirement.

3. Provide cable type (as indicated on the Shop Drawings Wire Legend) that is used for each electro-mechanical locking device, the conductor size, the estimated total length of cable, the estimated line loss (voltage drop), and the percentage of estimated line loss (voltage drop).

D. System operation description, including method of operation and supervision of each component and each type of circuit, and sequence of operations for all manually and automatically initiated system inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are not acceptable.

1.7 CLOSEOUT SUBMITTALS

A. Operation and maintenance data for inclusion in "Operating and Maintenance Manual" specified in Division 01. Include data for each type product, including all features and operating sequences, both automatic and manual. Include user's software data and recommendations for spare parts to be stocked at the site. Provide names, addresses, and telephone numbers of service organizations that stock repair parts for the system.

B. Product certifications signed by the manufacturers of system components certifying that their products comply with the referenced standards.

C. Separate Qualification Data for Manufacturers and Installers: Demonstrate their capabilities and experience as specified in Quality Assurance Article. Include lists of completed projects with project names and addresses, names of Contracting Officer and Government representatives, plus other information specified.

D. Record of field tests of system.

1.8 QUALITY ASSURANCE

A. Comply with NFPA 70, "National Electrical Code."

B. Listing and Labeling: Provide system and components that are listed and labeled for their indicated use and location on the Project.
   1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code," Article 100.
   2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Comply with UL Standard 609, 1023, and 1076.

D. FM Compliance: Provide FM approved card access system and components.

E. Single Source Responsibility: Obtain system components from a single source (the prime system manufacturer) that assumes responsibility for system components and for their compatibility.

1.9 COORDINATION

A. Access Control System Electrical Coordination: Coordinate with the layout and installation of scheduled electrified door hardware, and related access control equipment, with required connections to source power junction boxes, power supplies, detection and monitoring hardware and fire alarm system.
   1. Door Hardware Interface: The card key access control system to interface and be connected to electronic door control hardware (electromechanical locks, electric strikes, magnetic locks, door position switches, other monitoring contacts, and related auxiliary control devices) as described under Division 8 "Door Hardware". Coordinate with the
installation and configuration of specified door hardware being monitored or controlled with the controls, software and access control hardware specified in this Section.

2. Access Control Hardware Sets: The hardware sets listed represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality. Refer to Section 08 71 00 Door Hardware Schedule for hardware set information.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 ACCESS CONTROL SYSTEM EQUIPMENT, GENERAL

A. Surge Protection: Comply with minimum requirements of UL Standard 1449, "Transient Voltage Surge Suppressors," for each component using solid state devices and having a line voltage power source connection or an exterior underground signal connection.

B. Provide at the locations identified, a complete and operational Access Control and Security System including but not limited to the following equipment:
   1. Card Readers
   2. Door Logic Panels
   3. Relay output contacts
   4. All power supplies and/or transformers
   5. All equipment, security devices, components, wire, cable, and mounting hardware as required to meet specification requirements and manufacturers documented installation procedures.

C. Provide the quantity of new door licenses to the existing Continental Access building package to accommodate the increased number of readers being added as part of this project.

2.3 PHYSICAL SECURITY APPLIANCE

A. Physical Security Appliance (PSA): Stand-alone, modular multi-reader access controller shall be provided for standard door opening access control. The appliances shall communicate to the main system server using Ethernet TCP/IP, and shall serve as the data collection and communications interface between the system server and the various field devices such as card readers, alarm inputs and control outputs.

B. Power Requirements: Each Physical Security Appliance (PSA) shall accept a power input voltage of 120 VAC, 60Hz. Maximum power draw shall be no more than 300W. The PSA shall generate appropriate DC voltage levels for on-board use as required. External lock power supplies shall be required and sized for the appropriate number of locks (plus 20%) associated with each distributed controller. All power outputs to external devices shall be current limited in accordance with class 2 power limited wiring standards.

C. Battery Backup: The power supplies inherent in the PSA shall have the capability of charging standard gel-cell batteries, and shall be capable of operating on direct battery backup. The PSA shall be capable of providing at least four hours of full operation backup time, and shall be
capable of recharging its batteries in less than 48 hours. Batteries shall be mounted in a separate, dedicated battery shelf sized to contain the amount of batteries required.

2.4 ELECTRICAL POWER

A. Normal System Power Supply: 120 V 60 Hz from locked disconnect device. System components are supplied with power through separate power supplies. Provide all required power supplies and associated transformers as specified by the manufacturer.

B. Power Source Transfer: When normal power is interrupted, system is automatically switched to backup supply without degradation of critical system function or loss of signals or status data.
   1. Backup Source: Batteries in power supplies of individual system components. Such batteries are an integral part of power supplies of the components.
   2. Annunciation: Switching of the system or any system component to backup power is indicated as a change in system condition.

2.5 CARD ACCESS SYSTEM HARDWARE, GENERAL

A. Types, features, accessories, and mounting conditions of individual devices are as indicated.

B. Battery Backup: The access control panel shall be provided with back up battery power for up to four hours operation upon loss of AC power.

C. Suppression: The access control panel shall have provisions for relay suppressor kits for each relay used, to protect the access control panel from collapsing electrical fields.

D. Card Readers: Card readers shall be HID multiclass proximity readers.
   1. Proximity Readers: The system shall be provided with uni directional proximity card readers. The standard multiClass readers shall have a read range of five to eight inches. The reader shall be able to be mounted with its sides against metal door or window frames, and masonry walls. Long range readers mounted at vehicle gates shall have a minimum 10 inch read range.

2.6 POWER SUPPLIES

A. Provide power supplies as per manufacturers written recommendations with total number of powered devices for each power supply restricted to only consuming 75 percent of the power supplies rated amperage. Provide separate power supplies for system controllers (As per manufacturer), card readers (12VDC, 5 A), and locks (24 VDC, 7 A).

2.7 CONTACT INDICATOR SWITCHES

A. Contact indicators on overhead doors that are not supplied by the door manufacturer shall be Sentrol series 2300 type surface mounted magnetic reed type switches with opposing magnet, and shall be per manufacturer’s recommendations for the type of door.

2.8 WIRE AND CABLE

A. Cables: Bundled, shielded and unshielded, twisted-pair cable, shielded where manufacturer recommends shielded cable.
   1. Specified Manufacturer: Provide the specified product or prior approved equal.
      a. Coleman Cable Inc. (CCI) Part Number 73101 consisting the following cables bundled plenum rated within a yellow Low Smoke PVC, CMP/CL3P/FPLP jacket:
         1) PN 72321: 22 AWG 2/Conductor CMP. Typical use, Door Contact
         2) PN 72344: 22 AWG 4/Conductor CMP. Typical use, Request to Exit/Spare
         3) PN 75366: 22 AWG 6/Conductor shielded CMP. Typical use, Card Reader.
         4) PN 71944: 18 AWG 4/Conductor CMP. Typical use, Lock Power
      b. Any of the above cables may be used individually where cables in addition to those included in the bundle are required.
B. Comply with Division 26 Section "Wires and Cables" except as indicated.

C. Cable for Low Voltage Control and Signal Circuits: Shielded twisted pair cable with drain. Comply with Division 26 Section "Wires and Cables."

2.9 RACEWAY
A. Comply with Division 26 Section "Raceways."

2.10 DOOR HARDWARE SCHEDULE
A. Refer to Section 08 71 00 Door Hardware Schedule for hardware set information and assignment of required components to be provided by the Division 28 contractor.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Comply with recommendations in SIA CP-01.

B. Comply with TIA/EIA 606-A, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and publish as Project planning documents for review and approval.
   1. For each Location, record setup of controller features and access requirements.
   2. Prepare a specific plan for system testing, startup, and demonstration.
   3. Develop acceptance test concept and, on approval, develop specifics of the test.
   4. Develop cable and asset-management system details; input data from construction documents.

3.3 INSTALLATION
A. General: Install system according to NFPA 70, applicable codes, and manufacturer's printed instructions.

B. Wiring Method:
   1. Concealed in walls or above inaccessible ceilings: Install all cabling in raceways, ¾ inch minimum. Conduit fill shall not exceed 40%.
   2. Above Accessible Ceilings: Provide J-Hooks at not more than 5 feet on center. Fasten J-Hooks to walls with solid anchoring to studs. Where wall are unavailable suspend from structure using not less than 3/8” diameter threaded rod and provide tie to ceiling grid to prevent sway.
   3. Exposed: Install exposed cables in minimum 3/4” galvanized rigid metal conduit with straps at not more than 3 feet on center and minimum 1/4” gap between conduit and building surface. Use boxes that are specified for surface mounting.

C. Wiring within Panels and Enclosures: Bundle, wrap, and train the conductors to terminal points with 6-inches of slack minimum, 12-inches of slack maximum. Provide and use cable management hardware and distribution spools.
D. Number of Conductors: As recommended by system manufacturer for functions indicated. As a minimum install one bundled, shielded and unshielded, twisted pair cable for every access controlled door.

E. Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull and outlet boxes, terminal cabinets, and equipment enclosures.

F. Tighten connections to comply with tightening torques specified in UL Standard 486A.

G. Identification of Conductors and Cables: Color code conductors and apply wire and cable marking tape to designate wires and cables so media are identified and coordinated with system wiring diagrams.

H. Install power supplies and other auxiliary components for detection devices at the door controller panel or at a data gathering panel except as otherwise indicated. Do not install such items in the vicinity of the devices they serve.

3.4 GROUNDING

A. Comply with Section 28 05 26 "Grounding and Bonding for Electronic Safety and Security."

B. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."

C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

D. Bond shields and drain conductors to ground at only one point in each circuit.

3.5 DOOR RELEASE BUTTON INSTALLATION

A. Push Buttons: Where multiple push buttons are housed within a single switch enclosure, they shall be stacked vertically with each push-button switch labeled with 1/4-inch- (6.4-mm-) high text and symbols as required. Push-button switches shall be connected to the controller associated with the portal to which they are applied, and shall operate the appropriate electric strike, electric lock, or other facility release device.

3.6 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Section 26 05 53 "Identification for Electrical Systems" and with TIA/EIA 606-A.

B. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
   1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
   2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory authorized service representative to supervise the field assembly and connection of components and system pre-testing, testing, adjustment, and programming.

B. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

C. Pre-testing: Align and adjust the system and perform pre-testing of all components, wiring, and functions to verify conformance with specified requirements. Correct deficiencies by replacing malfunctioning or damaged items with new items. Retest until satisfactory performance and conditions are achieved.
D. Testing: Provide at least 10 days' notice of acceptance test performance schedule.

E. Operational Tests: Perform operational system tests to verify conformance with specifications. Test all modes of system operation and intrusion detection. Methodically test for false alarms in each zone of space intrusion detection devices by simulating activities outside indicated detection patterns.

F. Installer Start-up Responsibility: The Installer shall initiate system operation. The Installer shall provide competent start up personnel on each consecutive working day until the system is fully functional. Upon reoccurring technical problems, the Installer shall supply factory direct Manufacturer's support in the form of factory technical representation and/or diagnostic equipment until the resolution of those defined problems.

3.8 ADJUSTMENT

A. Occupancy Adjustments: When requested within 1 year of date of substantial completion, provide on site assistance in adjusting and reprogramming to suit actual occupied conditions. Provide up to 3 visits to the site for this purpose without additional cost.

3.9 DEMONSTRATION

A. Train Owner's operating personnel in the programming and operation of the system. Train Owner's maintenance personnel in the procedures and schedules involved in preventive maintenance and in programming, operating, adjusting, troubleshooting, and servicing of the system. Provide a minimum of 4 hours training.

B. Schedule training with advance notice of at least 7 days.

END OF SECTION