

PROJECT MANUAL FOR

# Logan Regional Hospital 2<sup>nd</sup> Floor Imaging Reception Remodel

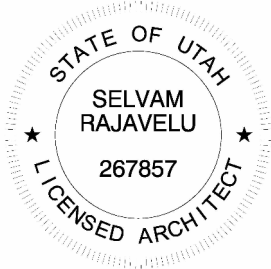
550 E. 1400 N.  
Logan, Utah 84341

for

**INTERMOUNTAIN HEALTHCARE**

## **Bidding Documents**

March 2021



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**INVITATION TO BID  
(REFER TO OWNER'S INVITATION TO BID DOCUMENTS INCLUDED IN RFP)**

- PROJECT:** Intermountain Healthcare  
**Logan Regional Hospital**  
**2<sup>nd</sup> Floor Imaging Reception Area Remodel**
- LOCATION:** The project is located at:  
  
550 East, 1400 North  
Logan, UT 84341
- OWNER:** **IHC Health Services, Inc.**
- TIME AND PLACE:** The Owner will receive bids on **T.B.D.**: See owner's Invitation to Bid.  
**IHC Health Services, Inc.** (Intermountain Healthcare)  
Facility Design and Construction (FD&C)  
36 South State Street, 21st Floor  
Salt Lake City, Utah 84111-1486  
  
**Attention:** Shannon Brown ([Shannon.M.Brown@imail.org](mailto:Shannon.M.Brown@imail.org))
- TYPE OF BID:** Bids shall be on a **Stipulated Sum** basis.
- TIME OF COMPLETION:** Bidders shall provide a Date of Substantial Completion on their Bid Form. Consideration will be given to bidders offering earlier times of completion.
- BIDDING DOCUMENTS:** Bidding documents will be available on **T.B.D.**, thru the office of **NJRA Architects, 5272 S. College Drive, Murray**, Utah 84123 in accordance with the Instructions to Bidders. Electronic copies of the Contract Documents (PDF's) will be provided to invited Contractors only. Bidding Documents **are not allowed to be posted** in any plan rooms. Any Contractor who violates this, will be disqualified.
- BID SECURITY/BONDS:** Bid Security or Performance and Payment Bonds will not be required for this project.
- LIQUIDATED DAMAGES:** Liquidated Damages will not be assessed for this project.
- RIGHT TO REJECT BIDS:** The **Owner** reserves the right to reject any or all bids, and to waive any irregularities in any bid or in the bidding

**END OF SECTION**

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**BID FORM**

**TO:** Shannon Brown  
Email: [Shannon.Brown@imail.org](mailto:Shannon.Brown@imail.org)

**PROJECT:** Intermountain Healthcare LRH – 2<sup>nd</sup> Floor Imaging Reception Area Remodel  
550 East, 1400 North  
Logan, UT 84341

**NAME OF BIDDER:** \_\_\_\_\_

**BIDDER ADDRESS:** \_\_\_\_\_

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

The undersigned, in compliance with your Invitation To Bid, having examined the Drawings and Specifications (Contract Documents) and related documents and the site of the proposed work and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of labor, hereby propose to furnish all labor, materials, services, equipment and appliances required in connection with or incidental to the construction of the above named project in strict conformance with the following specification and drawings:

Bidding and Contract Requirements, Intermountain Healthcare General Conditions, Specification Divisions as shown and all applicable addenda and Drawings as listed on the drawing cover sheets as prepared by NJRA Architects.

I/We certify, by signing this BID FORM, that I/We have a working relationship with the proposed subcontractors and that Bids we're not solicited from; and/or the received Contract Documents were not listed in any Plan Rooms for distribution to subcontractors broadly.

**BASE BID – for the Logan Regional Hospital, 2<sup>nd</sup> Floor Imaging Reception Area Remodel Project for Intermountain Healthcare:**

For Work of the contract listed above and shown on the Drawings and described in the Project Manual, I/We agree to perform for the sum of:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)  
(In the case of discrepancy, written amount shall govern)

**CONTRACTOR’S PROPOSED CONSTRUCTION TIME PERIOD:**

This Bid requires a construction time in **calendar days** from the date of authorization of \_\_\_\_\_ calendar days. The anticipated date of Substantial Completion is thus \_\_\_\_\_, 20\_\_\_\_.

The above Bid includes \_\_\_\_\_ winter weather delay days.

**ALTERNATES:**

**ADDITIVE ALTERNATE # 1: Remove existing perimeter wall wash light fixtures and terminate power as required. Extend ceiling grid and tile to infill removed light fixtures. See electrical drawings.**

\_\_\_\_\_ Dollars (\$\_\_\_\_\_)  
(In the case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE # 2: Remove all existing can lights in Radiology waiting area ceiling and provide new 2x4 LED light fixtures to match existing. See electrical drawings. Replace ceiling tile where lights are being removed.**

\_\_\_\_\_ Dollars (\$\_\_\_\_\_)  
(In the case of discrepancy, written amount shall govern)

**ADDENDA:**

I/We acknowledge receipt of the following addenda for the above noted project:

**TYPE OF ORGANIZATION:**

(Corporation, Partnership, Individual, etc.) \_\_\_\_\_

SEAL (If a Corporation)

Respectfully Submitted,

\_\_\_\_\_  
Name of Bidder

\_\_\_\_\_  
Authorized Signature

## GENERAL CONDITIONS

1. General Provisions
2. Intermountain
3. A/E
4. Contractor
5. Subcontractors
6. Protection of Persons and Property
7. Modifications, Request for Information, Proposed Change Orders, and Claims Process
8. Payments and Completion
9. Tests and Inspections, Substantial and Final Completion, Uncovering, Correction of Work, and Guaranty Period
10. Insurance and Bonds
11. Miscellaneous Provisions
12. Termination or Suspension of the Contract

### 1. GENERAL PROVISIONS.

#### 1.1 Basic Definitions.

**“Adverse Weather”**: Weather conditions that are seasonably abnormal and could not reasonably have been anticipated.

**“A/E”**: Generally, the licensed architect (or architecture firm) or engineer (or engineering firm) for the Project. For Contracts where the design professional is an interior designer, landscape subconsultant or other design professional, “A/E” will be deemed to refer to that design professional. If the type of design professional is not subject to professional licensure requirements, the professional must meet the prevailing standards in the State in which the Project is located for the applicable practice. When Intermountain elects not to engage an A/E for a Project, Intermountain will be considered the A/E for the Project.

**“A/E’s Agreement”**: Unless the context requires otherwise, the agreement executed by A/E and Intermountain for the Project.

**“Addenda”**: Written or graphic instruments issued before the opening of Bids, which clarify, correct or change the bidding documents or the Contract Documents.

**“ASI”**: A Supplemental Instruction issued by A/E to Contractor, which may result in clarifications or minor changes in the Work, but which does not affect the Contract Time or the Contract Sum.

**“Bid”**: The offer of the bidder submitted on the prescribed form setting forth the proposed stipulated sum for the Work to be performed.

**“Bonds”**: The bid bond, payment and performance bonds, and other instruments of security.

**“Change Order”**: A written instrument signed by Intermountain and Contractor, stating their agreement for changes to the Contract as specified on the required Intermountain change order form.

**“Claim”**: A dispute, demand, assertion or other matter arising in connection with the Contract or the Project submitted by Contractor or a Subcontractor at any tier in accordance with these General Conditions. A requested amendment, requested Change Order, or a Construction Change Directive (CCD) is not a Claim unless agreement cannot be reached in accordance with the procedures in these General Conditions.

**“Construction Change Directive” or “CCD”**: A written order signed by Intermountain, directing a change in the Work, and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. Intermountain may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions; even if it may impact the Contract Sum and Contract Time.

**“Contract”**: The Contract Documents form the Contract for Construction.

**“Contract Documents”**: The documents identified as such in the Contractor’s Agreement.

**“Contract Sum”**: The amount stated in the Contractor’s Agreement payable by Intermountain to Contractor for performance of the Work under the Contract Documents.

**“Contract Time”**: The Contract Time means the period of time for Contractor’s Substantial Completion of the Work to be established as set forth in the Contractor’s Agreement.

**“Contractor”**: The person or entity identified as the “Contractor” in the Contractor’s Agreement.

**“Contractor’s Agreement”**: The “Contractor’s Agreement” means the Construction Manager/General Contractor Agreement or the General Contractor Agreement for a Stipulated Sum, as applicable, executed by Contractor and Intermountain for the Project.

**“Contractor’s Direct Costs”**: Actual costs incurred by the Contractor for labor, materials, equipment, insurance, bonds, Subcontractors and on-site supervision. They do not include labor costs for project managers or other off-site administration.

**“Day” or “Days”**: Calendar day unless otherwise specified.

**“Defective”**: Work that does not conform to the Contract Documents or does not meet the requirements of any inspection, referenced standard, code, test or approval referred to in the Contract Documents or by applicable law, or has been damaged.

**“Director”**: Intermountain’s Executive Director of Design & Construction unless the context requires otherwise. Director may include a designee selected by the Director for a specific function.

**“Drawings”**: The construction drawings identified in the Contractor’s Agreement.

**“Intermountain”**: IHC Health Services, Inc., operating through its Department of Facility Design and Construction. Unless the context requires otherwise, Intermountain is the “Owner” as that term is commonly referred to in the construction industry.

**“Intermountain Representative” or “Owner’s Representative”**: The person identified as such in the Contract Documents.

**“Inspection” (or any derivative)**: A review of the Project, including but not limited to a visual review of the Work to ascertain if the Work is in accordance with the Contract Documents, including all applicable building codes and construction standards.

**“Invitation to Bid”**: Intermountain’s solicitation or request to a contractor to provide a Bid.

**“Modification”**: (1) Change Order, (2) Construction Change Directive, or (3) ASI.

**“Notice to Proceed”**: A document prepared by Intermountain authorizing Contractor to commence Work on the Project. It is deemed issued upon delivery to Contractor or upon being sent by Intermountain to the address for Contractor’s specified in the Bid or Proposal.

**“Partial Use”**: Placing a portion of the Work in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion for all the Work. Partial Use does not constitute “substantial completion.”

**“Product Data”**: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by Contractor to illustrate materials or equipment for some portion of the Work.

**“Project”**: Generally identified and defined in the Contractor’s Agreement and Contract Documents. It includes all of the Work to be performed under the Contract Documents.

**“Project Manual” (for construction)**: The volume of assembled Specifications for the Work, which may include the bidding/proposal requirements, sample forms, and General or Supplementary Conditions of the Contract.

**“Proposal”**: A/E’s or Contractor’s response to Intermountain’s Request for Proposal.

**“Proposal Request”** or **“PR”**: A written request submitted to Contractor for a proposal to resolve an issue as part of the Change Order or Contract Modification process.

**“Proposed Change Order”** or **“PCO”**: An informal request by Contractor to Intermountain Representative to commence the Contract Modification Process. It will not be considered a “Claim.” The PCO may be related to any potential or actual delay, disruption, unforeseen condition or materials or any other matter for which Contractor intends to seek additional monies or time.

**“Request for Information”** or **“RFI”**: A request by Contractor to A/E for information, direction or clarification regarding the Contract Documents, plans or specifications.

**“Request for Proposal”** or **“RFP”**: Intermountain’s solicitation for Contractor Proposals.

**“Sales Tax”** and/or **“Use Tax”**: Unless the context requires otherwise, the sales tax or use tax collected or to be collected by any Federal or State Tax Commission as well as by any special district, local government or political subdivision.

**“Samples”**: Physical examples, which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

**“Shop Drawings”**: Drawings, diagrams, schedules and other data specially prepared for the Work by Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

**“Specifications”**: The portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards, installation and workmanship for the Work, and for performance of related systems and services.

**“Subcontractor”**: Any person or entity that has a direct contract with Contractor, including any trade contractor or specialty contractor, and/or with any other Subcontractor at any tier to provide labor or materials for the Work.

**“Subcontractor’s Direct Costs”**: Actual costs incurred by a Subcontractor for labor, materials, equipment, insurance, bonds, lower-tier Subcontractors and supervision.

**“Substantial Completion”**: Completion of the Work or designated portion thereof in accordance with the Contract Documents to a point sufficient to allow Intermountain to occupy and use the Work for its intended purposes, including without limitation all systems shall be fully functional and operate as designed, and the A/E’s certification that Contractor has achieved Substantial Completion of the Work. The date of Substantial Completion is the date certified as such by the A/E in accordance with the Contract Documents.

**“Work”**: All labor, materials, tools, equipment, construction and services required by the Contract Documents.

## **1.2 Correlation and Intent of Contract Documents.**

- 1.2.1 The intent of the Contract Documents is to require Contractor to provide all labor, materials, equipment, construction, and services necessary for the proper execution and completion of the Work. The Contract Documents are complementary and what is required by any one will be as binding as if required by all. Contractor will perform the Work in accordance with the requirements expressly set forth in or reasonably inferable from the Contract Documents.
- 1.2.2 The organization of the Contract Documents is not intended to control Contractor in dividing the Work among Subcontractors or to establish the extent of the Work to be performed by any trade.
- 1.2.3 Words used in the Contract Documents that have well known technical or trade meanings are used therein in accordance with such recognized meanings.

1.2.4 In the interest of brevity, the Contract Documents may omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

**1.3 Ownership and Use of Contract Documents.** The Drawings, the Project Manual, and copies thereof are the property of Intermountain. Contractor will not use these documents on any other project. Contractor may retain one copy of the Drawings and the Project Manual as a contract record set and will return or destroy all remaining copies following final completion of the Work.

**1.4 Public Statements Regarding Project.** Contractor will not make any statements or provide any information to the media about the Project without the prior written consent of Intermountain. If Contractor receives any requests for information from media, Contractor will refer such requests to Intermountain.

**1.5 Ownership and Use of Renderings and Photographs.** Renderings representing the Work are the property of Intermountain. All photographs of the Work, whether taken during performance of the Work or at completion, are the property of Intermountain. Intermountain reserves all rights including copyrights to renderings and photographs of the Work. No renderings or photographs will be used or distributed without written consent of Intermountain.

**1.6 Confidentiality / Property Rights.**

1.6.1 All Drawings, Specifications and other documents prepared by A/E are and will remain the property of Intermountain, and Intermountain will retain all common law, statutory and other reserved rights with respect thereto. These documents were prepared and are intended for use as an integrated set for the Project which is the subject of the Contractor's Agreement and constitute works made for hire. Contractor will not modify or use Contract Documents on any other project without the prior written consent of Intermountain. Intermountain may withhold its consent in its absolute discretion. Any non-permissive use or modification, by Contractor, Contractor's Subcontractors at any tier or anyone for whose acts Contractor is liable, will be at Contractor's sole risk. Contractor will hold harmless and indemnify Intermountain from and against any and all claims, actions, suits, costs, damages, loss, expenses and attorney fees arising out of such non-permissive use or modification by Contractor. Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by A/E or Intermountain appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license will bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by A/E or Intermountain. Submittals or distributions necessary to meet official regulatory requirements or for other purposes relating to completion of the Project are not to be construed as a publication in derogation of Intermountain's copyright or other reserved rights.

1.6.2 In addition, Contractor will ensure that Contractor, Subcontractors, and the employees, agents and representatives of Contractor and its Subcontractors maintain in strict confidence, and will use and disclose only as authorized by Intermountain all Confidential Information of Intermountain that Contractor receives in connection with the performance of the Contract. Notwithstanding the foregoing, Contractor may use and disclose any information to the extent required by an order of any court or authority having jurisdiction, but only after it has notified Intermountain and Intermountain has had an opportunity to obtain reasonable protection for such information in connection with such disclosure. For purposes of the Contract, "Confidential Information" means:

1.6.3 The name or address of any affiliate, customer or contractor of Intermountain or any information concerning the transactions of any such person with Intermountain;

1.6.4 Any information relating to contracts, agreements, business plans, budgets or other financial information of Intermountain to the extent such information has not been made available to the public by Intermountain; and



- 1.6.5 Any other information that is marked or noted as confidential by Intermountain at the time of its disclosure.

**1.7 Comply with Intellectual Property Rights of Others.** Contractor represents and warrants that no Work (with its means, methods, goods, and services attendant thereto), provided to Intermountain will infringe or violate any right of any third party and that Intermountain may use and exploit such Work, means, methods, goods, and services without liability or obligation to any person or entity (specifically and without limitation, such Work, means, methods, goods, and services will not violate rights under any patent, copyright, trademark, or other intellectual property right or application for the same).

## **2. INTERMOUNTAIN.**

### **2.1 Information and Services Required of Intermountain.**

- 2.1.1 Intermountain Representative. Intermountain will designate an Intermountain Representative authorized to act in Intermountain's behalf with respect to the Project. Intermountain or such authorized representative will furnish to Contractor information or services Intermountain is required to furnish under the Contract Documents within a reasonable time in order to avoid a delay in the orderly and sequential progress of the Work.
- 2.1.2 Specialists and Inspectors. Intermountain reserves the right (but without obligation to provide building inspection services. This may include 'routine' and 'special' inspections. Intermountain may assign an inspector or specialist to note deviations from, or necessary adjustments to, the Contract Documents or to report deficiencies or defects in the Work. The inspector or specialist's activities in no way relieve Contractor of the responsibilities set forth in the Contract Documents.
- 2.1.3 Inspections. Intermountain and its representatives will have the right to inspect any portion of the Work wherever located at any time.
- 2.1.4 Surveys and Legal Description. Intermountain will furnish surveys describing the property lines and benchmarks for grading. Contractor will review this information, including the surveys and any provided geotechnical studies, and compare such information with observable physical conditions and the Contract Documents.
- 2.1.5 Prompt Information and Services. Upon receipt of a written request from Contractor, Intermountain will furnish information or services under Intermountain's control with reasonable promptness to avoid delay in the orderly progress of the Work.
- 2.1.6 Copies of Drawings and Project Manuals (for Construction). Unless otherwise provided in the Contract Documents, Contractor will be furnished electronic copies of Drawings and Project Manuals for Contractor's use in connection with the execution of the Work for the Project. Contractor will be responsible for making any further needed copies of the Construction Documents, subject to the copyright requirements.

### **2.2 Construction by Intermountain or By Separate Contractors.**

- 2.2.1 Intermountain's Right to Perform Construction and to Award Separate Contracts.
- a. *In General.* Intermountain reserves the right to perform construction or operations related to the Project with Intermountain's own forces, and to award separate contracts related to the Project or other construction or operations on the site.
  - b. *Coordination and Revisions.* Intermountain will provide for coordination of the activities of Intermountain's own forces and of each separate contractor with the Work of Contractor, who will cooperate with them. Contractor will promptly notify in writing if any such independent action will in any way compromise Contractor's ability to meet Contractor's responsibilities under the Contract. Contractor will participate with other separate contractors and Intermountain in reviewing their construction schedules when directed to do so. Contractor will make any revisions to the construction schedule and Contract Sum deemed necessary after a

joint review and agreement by Intermountain. The construction schedules will then constitute the schedules to be used by Contractor, separate contractors and Intermountain until subsequently revised.

#### 2.2.2 Mutual Responsibility.

- a. *Contractor Coordination.* Contractor will afford Intermountain and separate contractor(s) a reasonable opportunity for delivery and storage of their materials and equipment and performance of their activities and will connect and coordinate Contractor's construction and operations with theirs where applicable.
- b. *Reporting Problems to Intermountain.* If part of Contractor's Work depends on work by Intermountain or a separate contractor, Contractor will, before proceeding with that portion of the Work, inspect and promptly report in writing to Intermountain apparent discrepancies or defects in workmanship that would render it unsuitable for proper execution, performance, or results. Failure of Contractor to so inspect and make this report will constitute an acceptance and acknowledgment that Intermountain's or separate contractors completed or partially completed construction is fit and proper to receive Contractor's Work, except as to defects in workmanship not then reasonably discoverable.
- c. *Costs.* Costs caused by delays or by improperly timed activities or Defective construction will be borne by the responsible party in accordance with the procedures and provisions of the Contract Documents.
- d. *Contractor Remedial Work.* Contractor will promptly remedy damage caused by Contractor or any Subcontractor to completed or partially completed work of Intermountain or of separate contractors or to the property of Intermountain or separate contractors and subcontractors.
- e. *Intermountain's Right to Clean Up.* If a dispute arises among Contractor and separate contractors as to the responsibility under their separate contracts for maintaining the Project free from waste materials and rubbish, Intermountain may clean the Project, allocate the cost among those responsible as Intermountain and A/E determine to be just, and withhold such cost from any amounts due or to become due to Contractor.

### 3. A/E.

#### 3.1 A/E's Administration of the Contract.

- 3.1.1 In General. A/E assists Intermountain with the administration of the Contract as described in the Contract Documents.
- 3.1.2 Site Visits. Site visits or inspections by A/E, Intermountain or any Intermountain representative will in no way limit or affect Contractor's responsibility to comply with all the requirements and the overall design concept of the Contract Documents as well as all applicable laws, statutes, ordinances, resolutions, codes, rules, regulations, orders and decrees. A/E will promptly submit to Intermountain a written report subsequent to each site visit.
- 3.1.3 Communications Facilitating Contract Administration. Except as authorized by Intermountain or as otherwise provided in the Contract Documents, including these General Conditions, A/E and Contractor will communicate through the Intermountain Representative on issues regarding the timing of the Work, cost of the Work, and scope of the Work. Contractor will comply with communication policies agreed upon at any pre-construction meeting with Intermountain. Communications by and with A/E sub-consultants will be through A/E. Communications by and with Subcontractors will be through Contractor. Communications by and with separate contractors will be through Intermountain.
- 3.1.4 A/E May Reject Work, Order Inspection, Tests. A/E will have the authority to reject Work which, based upon A/E's knowledge or what may be reasonably inferred from A/E's site observations and review of data, does not conform to the Contract Documents or is damaged or rendered unsuitable.

Whenever A/E considers it necessary or advisable for implementation of the intent of the Contract Documents, A/E will have the authority to require additional inspections or testing of the Work in accordance with the provisions of the Contract Documents, whether or not such Work is fabricated, installed or completed. However, neither this authority of A/E nor a decision made in good faith either to exercise or not to exercise such authority will give rise to a duty or responsibility of A/E to Contractor, Subcontractors, their agents or employees or other persons performing portions of the Work, including separate contractors.

**3.1.5 A/E Review Contractor's Submittals.**

- a. Contractor will submit shop drawings, product data, and samples and other submittals required by the Contract Documents to A/E as required by the approved submittal schedule.
- b. A/E will review and approve or take other appropriate action upon Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the purpose of checking for conformance with the information and design concepts expressed in the Contract Documents. A/E action taken on a submittal will not constitute a Modification of the Contract.
- c. A/E's action will be taken no later than fifteen (15) Days following A/E's receipt of the submittal, unless agreed to otherwise by Contractor and Intermountain.
- d. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor as required by the Contract Documents.
- e. A/E's review of Contractor's submittals will not relieve Contractor of the obligations under the Contract Documents.
- f. A/E's review will not constitute approval of safety precautions or, unless otherwise specifically stated by A/E, of any construction means, methods, techniques, sequences or procedures.
- g. A/E's approval of a specific item will not indicate approval of an assembly of which the item is a component.
- h. When professional certification of performance characteristics of materials, systems or equipment is required by the Contract Documents, A/E will be entitled to rely upon such certifications to establish that the materials systems or equipment will meet the performance criteria required by the Contract Documents.

**3.2 Ownership and Use of A/E's Drawings, Specifications and Other Documents.** All Drawings, Specifications and other documents prepared by A/E are and will remain the property of Intermountain, and Intermountain will retain all common law, statutory and other reserved rights with respect thereto. These documents were prepared and are intended for use as an integrated set for the Project which is the subject of the Contractor's Agreement and constitute works made for hire. Contractor will not modify or use Contract Documents on any other project without the prior written consent of Intermountain. Intermountain may withhold its consent in its absolute discretion. Any non-permissive use or modification, by Contractor, Contractor's Subcontractors at any tier or anyone for whose acts Contractor is liable, will be at Contractor's sole risk. Contractor will hold harmless and indemnify Intermountain from and against any and all claims, actions, suits, costs, damages, loss, expenses and attorney fees arising out of such non-permissive use or modification by Contractor. Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by A/E or Intermountain appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license will bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by A/E or Intermountain. Submittals or distributions necessary to meet official regulatory requirements or for other purposes relating to completion of the Project are not to be construed as a publication in derogation of Intermountain's copyright or other reserved rights.

**4. CONTRACTOR.** Contractor's duties include the professional services of a business, administrative and management consultant to Intermountain; including all budget, scheduling, quality, safety and all other services related to assuring compliance with the Contract Documents.

**4.1 Review of Contract Documents and Field Conditions by Contractor.** By executing the Contractor's Agreement, Contractor represents that it has visited the Project site, familiarized itself with the local conditions under which the Work is to be performed, and correlated its own observations with the requirements of the Contract Documents.

**4.1.1 Reviewing Contract Documents, Information, Reporting Errors, Inconsistencies or Omissions.**

- a. Contractor will carefully study and compare the Contract Documents with each other and with information available relating to the Project or furnished by Intermountain before commencing and during performance of each portion of the Work and will at once report to Intermountain and A/E any errors, inconsistencies or omissions it discovers. If Contractor performs any construction activity without such notice to Intermountain and A/E and before the resolution of the error, inconsistency or omission, Contractor will assume responsibility for such performance and will bear the attributable costs for correction.
- b. Contractor will give Intermountain and/or A/E notice of any additional drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work, sufficiently in advance of the need for information so as not to delay the Work.
- c. It is not Contractor's responsibility to ascertain that the Contract Documents are in accordance with requirements of applicable laws, statutes, ordinances, building codes, rules and regulations. However, if Contractor observes that portions of the Contract Documents are at variance with those requirements, Contractor will immediately notify Intermountain and/or A/E in writing. Contractor will not proceed unless Intermountain and/or A/E effects Modifications to the Contract Documents required for compliance with such requirements. Contractor will be fully responsible for any work knowingly performed contrary to such requirements and will fully indemnify Intermountain against loss and bear all costs and penalties arising therefrom.

**4.1.2 Field Conditions.**

- a. Contractor will take field measurements and verify field conditions and will carefully compare such field measurements and conditions and other information known to Contractor, or information which a Contractor of ordinary skill and expertise for the type of Work involved would have known, before commencing activities. Errors, inconsistencies or omissions discovered will be reported to Intermountain and A/E at once. If Contractor performs any construction activity without such notice to Intermountain and A/E and before the resolution of the error, inconsistency or omission, Contractor will not be entitled to any compensation for additional costs attributable to correction or otherwise to Contractor resulting from field measurements or conditions different from those anticipated by Contractor which would have been avoided had Contractor taken field measurements and verified field conditions before ordering the materials or commencing construction activities.
- b. If site conditions indicated in the Contract Documents or other information provided by Intermountain or A/E to Contractor differ materially from those Contractor encounters in performance of the Work, Contractor will immediately notify Intermountain and/or A/E in writing of such differing site conditions.

**4.1.3 Perform in Accordance with Contract Documents and Submittals.** Contractor will perform the Work in accordance with the Contract Documents and submittals approved in accordance with the Contract Documents. Should Contractor or any of its Subcontractors become aware of any question regarding the meaning or intent of any part of the Contract Documents before commencing that portion of the Work about which there is a question, Contractor will request an interpretation or clarification from Intermountain and/or A/E before proceeding. Contractor proceeds at its own risk if it proceeds with

the Work without first making such a request and receiving an interpretation or clarification from Intermountain and/or A/E.

- 4.1.4 Performance to Produce the Complete System and Intended Results. Performance by Contractor will be required to the extent consistent with the Contract Documents and reasonably inferable from the Contract Documents as being necessary to allow the system to function within its intended use.
- 4.1.5 Intent and Hierarchy. The Contract Documents should be read as a whole and wherever possible, the provisions should be construed in order that all provisions are operable. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by Contractor. The Contract Documents are complimentary, and what is required by one Document or provisions thereof will be as binding as if required by all the Documents or provisions thereof. In case of an irreconcilable conflict between provisions within a Contract Document or between Contract Documents, the following priorities will govern as listed below:
- a. A particular Modification will govern over all Contract Document provisions or Modifications issued before this particular Modification.
  - b. A particular Addendum will govern over all other Contract Document provisions issued before this particular Addendum. Subsequent Addenda will govern over all prior Addenda.
  - c. The Supplementary Conditions will govern over the General Conditions.
  - d. The Agreement and these General Conditions will govern over all other Contract Documents except for the Supplementary Conditions, Addenda, Modifications.
  - e. The drawings and specifications will not govern over any of the documents listed above. The specifications take precedence over the drawings.
  - f. Within the Drawings, larger scale drawings take precedence over smaller scale drawings, figured dimensions over scaled dimensions, and noted materials over graphic indications.
  - g. In case of a conflict or ambiguity within the same level of hierarchy of described documents, Intermountain reserves the right to select the most stringent requirement unless the preponderance of the contract indicates the less stringent requirement.
- 4.1.6 Dividing Work and Contractor Representation. Organization of the specifications into divisions, sections and articles, and arrangement of Drawings, will not control Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. Contractor represents that the Subcontractors, Sub-subcontractors, manufacturers and suppliers engaged or to be engaged by it are and will be familiar with the requirements for performance by them of their obligations. Where the Contract Documents require Contractor to provide professional services for architecture or engineering, Contractor will cause such services to be performed by appropriately licensed professionals.
- 4.1.7 Planning and Priority. Contractor will plan and schedule its work to facilitate the Project and will maintain a work schedule to place proper priority to sequence work to complete the project timely.
- 4.1.8 Prior to Contractor taking control over any area in any existing facility or on any project site, Contractor will provide prior written notice to Intermountain with sufficient time (no less than 30 Days) to allow Intermountain's Asset Recovery Team to remove, secure, and otherwise address existing materials, furniture, fixtures, equipment, and other assets located thereon.

## **4.2 Supervision and Construction Procedures.**

- 4.2.1 Supervision and Control.
- a. Contractor will utilize its best skill, efforts, and judgment to provide efficient business administration and supervision, to furnish at all times an adequate supply of workers and materials, and to perform the Work in an expeditious and economical manner consistent with

the interests of Intermountain.

- b. Contractor will supervise and direct the Work. Contractor will be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work.
- c. All loss, damage, liability, or cost of correcting Defective work arising from the use of any construction means, methods, techniques, sequences or procedures will be borne by Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless Contractor has given timely notice to Intermountain and A/E in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and Intermountain has then instructed Contractor in writing to proceed at Intermountain's risk.

4.2.2 Responsibility. Contractor will be responsible to Intermountain for acts and omissions of Contractor's employees, Subcontractors, and their agents and employees, and other persons performing portions of the Work under a contract with Contractor or on behalf of Contractor.

4.2.3 Not Relieved of Obligations. Contractor will not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of Intermountain or its agents in Intermountain's administration of the Contract, or by tests, inspections or approvals by Intermountain, A/E, or their consultants, or as required or performed by persons other than Contractor or for those that Contractor is liable.

4.2.4 Inspections and Approvals.

- a. Contractor is responsible for requesting inspections for various stages and portions of the Work required under the Contract Documents in a timely manner.
- b. Contractor will be responsible for inspection of portions of the Work already completed to determine that such portions are in proper condition to receive subsequent portions of the Work.
- c. If any of the Work is required to be inspected or approved by the terms of the Contract Documents by any public authority, Contractor will timely request such inspection or approval to be performed in accordance with Article 9. Except as provided in Article 9, work will not proceed without any required inspection and the associated authorization to proceed. Contractor will promptly notify Intermountain if the inspector fails to appear at the site.

#### **4.3 Labor and Materials.**

4.3.1 Payment by Contractor. Except to the extent it is otherwise stated in the Contract Documents, Contractor will provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities, supplies, consumables and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

4.3.2 Discipline and Competence. Contractor will enforce strict discipline and good order among Contractor's employees, Subcontractors, agents, representatives and other persons performing under the Contract Documents. Contractor will not permit employment of unfit persons or persons not skilled in tasks assigned to them.

4.3.3 Phased Construction / Accommodations for Facilities to Stay Operational. Contractor and all Subcontractors will direct and perform the Work, phase and coordinate all construction and related activities and timing, in a manner to preserve ongoing patient care and safety to all and to accommodate in every instance Intermountain's ongoing business operations such that facilities stay fully functioning and operational at all times.

**4.4 Taxes and Other Payments to Government.** Intermountain will pay all taxes and assessments on the real property comprising the Project site. Contractor will pay all applicable sales, consumer, use, payroll, workers

compensation, unemployment, old age pension, surtax, and employment-related and similar taxes related to performance of the Work or portions thereof provided by Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect, and will comply with the laws and regulations regarding the payment of Sales and/or Use Tax and any applicable exemptions.

#### **4.5 Permits, Fees, Notices, Labor and Materials.**

##### **4.5.1 Permits and Fees.**

- a. Intermountain will obtain and pay for all zoning and use permits and permanent easements necessary for completion of the Work.
- b. Contractor will obtain and pay for the building permit, and all other permits, governmental fees, licenses and inspections necessary for the proper execution and completion of the Work.
- c. Contractor will secure any certificates of inspection and of occupancy required by authorities having jurisdiction over the Work. Contractor will deliver these certificates to A/E before issuance of the Certificate of Substantial Completion by A/E.

4.5.2 Compliance with Law, Public Authorities, Notices. Contractor will comply with all applicable federal, state and local laws, statutes, ordinances, resolutions, rules, regulations, codes, and lawful orders of public authorities.

##### **4.5.3 Correlation of Contract Documents and Enactments.**

- a. It is not Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, resolutions, building codes, and rules and regulations. Notwithstanding this, if Contractor observes, or if such is readily observable to a Contractor of ordinary skill and expertise for the type of Work involved, that a portion of the Contract Documents is at variance therewith, Contractor will promptly notify A/E and Intermountain in writing, and necessary changes will be accomplished by appropriate Modification.
- b. Contractor will coordinate and supervise the work performed by Subcontractors so that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. Contractor and all Subcontractors will at all times afford each trade, any separate contractor, or Intermountain, reasonable opportunity for the installation of Work and the storage of materials.
- c. Contractor is fully responsible for the Project and all materials and work connected therewith until Intermountain has accepted the Work in writing. Contractor will replace or repair at its own expense any materials or work damaged or stolen, regardless of whether it has received payment for such work or materials from Intermountain.
- d. Contractor will remedy all damage or loss to any property caused in whole or in part by Contractor, any Subcontractor, or by anyone for whose acts any of them may be liable.
- e. Intermountain may elect to purchase materials required for the Work. In that event, Contractor will comply with the procedures set forth in the Contract Documents relating to such materials.

4.5.4 Failure to Give Notice. If Contractor, or any Subcontractor thereof performs Work without complying with the requirements of this Article 4.5 hereinabove, Contractor will assume appropriate responsibility for such Work and will bear the appropriate amount of the attributable costs.

##### **4.5.5 Intermountain-Purchased Materials and Equipment.**

- a. In addition to Contractor's other obligations with respect to separate Intermountain provided work or materials, Contractor's obligations and duties with respect to Intermountain-purchased materials, equipment, and work include:

- (i) Scheduling: The Contractor shall furnish Intermountain with a schedule of dates on which the Contractor requires delivery of Intermountain-purchased materials. Intermountain will arrange for the materials to be delivered to the construction site or picked up by Contractor on or before the specified dates. If delivery or pick up dates are changed, rescheduled, or otherwise varied from the original schedule, the Contractor shall notify Intermountain in writing of delivery or pick up date rescheduling and the Contractor shall coordinate the delivery or pick up of the Intermountain-purchased materials or equipment directly with the supplier.
- (ii) Equipment / Vehicles: If Intermountain buys equipment or vehicles for Contractor's use on the Project, Contractor will (in addition to all other obligations herein relative to such equipment or vehicles) be fully and solely responsible for such equipment and vehicles as well as the use and use consequences thereof for any and all purposes (including without limitation to protect, secure, inspect, upkeep and make repairs, and insure such equipment and vehicles as well as to monitor, guide, direct, oversee, protect, and control the use and use consequences of such equipment and vehicles) until completion of the Project and Contractor's return of such equipment and/or vehicles to Intermountain.
- (iii) Pre-Installation Inspection: The Contractor shall be responsible for receiving, inspecting and storing all Intermountain- purchased materials and equipment until the materials or equipment are needed for installation or use by the Contractor. Regardless of any inspection performed by Intermountain of the Intermountain-purchased materials or equipment, the Contractor shall be responsible for inspecting the Intermountain-purchased materials and equipment to determine suitability, quality and conformance with specifications before installation or use or at such other times as the Contractor may desire in order to avoid interruptions and delays in the progress of the Project. The Contractor shall reject any material which does not meet specifications or which appears to have any defect which may make the material unsuitable for use in the Project. The Contractor shall notify Intermountain and the manufacturer or supplier of all defects and assist Intermountain in arranging for the repair, replacement or correction of the defective condition. The Contractor shall not be entitled to an extension of any deadline or completion date which results from failure to discover defects which the Contractor should have discovered through an inspection.
- (iv) Defective Materials: The Contractor acknowledges that use of improper or defective material may result in costs and damages to Intermountain in excess of the value of the materials; that after use in the Project it may be difficult or impossible to inspect the material to determine the cause of any failure; and that in the event of the failure of material there may be a question as to the cause of the failure. Because the Contractor's employees will be the last to handle and inspect material prior to incorporation into the Project, the Contractor will be liable to Intermountain for damages resulting from failure of Intermountain- purchased materials during the Contractor's warranty period specified herein from any cause whatsoever unless the Contractor provides clear and convincing proof that (1) the entire loss from a failure is covered by a valid manufacturer's or supplier's warranty, or (2) the Contractor could not have prevented the failure by complying with the requirements of this Section concerning Intermountain-purchased materials.
- (v) Claims: The Contractor agrees to assist Intermountain to present claims to manufacturers and suppliers for defects in Intermountain-purchased materials. Where there is any question as to the division of liability between the Contractor and a manufacturer or vendor, the Contractor shall provide all relevant information in the Contractor's possession which may aid Intermountain in determining the division of responsibility. Intermountain shall have final approval of any proposed adjustment or settlement of warranty claims.



- (vi) Implied Warranties: The benefit of contractual and implied warranties with respect to Intermountain-purchased materials and equipment shall run to Intermountain and not to the Contractor.
  - (vii) Unloading: Except as otherwise provided herein, the Contractor shall be responsible for unloading all Intermountain- purchased materials and equipment and for verifying delivery amounts to Intermountain.
  - (viii) Custody and Security: The Contractor shall secure and protect Intermountain-purchased materials and equipment from loss, deterioration, damage, theft, vandalism or destruction. If any Intermountain-purchased materials or equipment are damaged, stolen, or lost, Contractor will timely replace such at Contractor's sole cost and expense. In such event, Contractor will not be entitled to any modification in Contract Time or Contract Sum.
  - (ix) Reports: At Intermountain's request, the Contractor shall furnish reports to the Intermountain Representative demonstrating the Contractor's compliance with this Section.
  - (x) Retained Ownership: All materials and equipment purchased by Intermountain which remain after completion of the Project shall be the property of Intermountain. If Intermountain does not wish to retain or dispose of surplus Intermountain-purchased materials or equipment, the Contractor shall remove and dispose of them.
- b. None of the foregoing duties of the Contractor with respect to Intermountain-purchased materials shall prevent Intermountain from exercising any prerogative of ownership of the materials or equipment.

**4.6 Superintendent.** Contractor will employ a competent superintendent and necessary assistants who will be in attendance at the Project site at all times during performance of the Work. The superintendent will represent Contractor, and communications given to the superintendent will be as binding as if given to Contractor. Important communications will be confirmed in writing. Other communications will be similarly confirmed on written request in each case.

#### **4.7 Time and Contractor's Construction Schedules.**

##### **4.7.1 Progress and Completion.**

- a. *Time Is of The Essence; Complete Within Contract Time.* Time is of the essence. By executing the Contractor's Agreement, Contractor confirms that the Contract Time is adequate to perform the Work. Contractor will proceed expeditiously with adequate forces to achieve Substantial Completion within the Contract Time.
- b. *Notice to Proceed and Insurance.* Contractor will not prematurely commence operations on the site or elsewhere before the issuance of a Notice to Proceed by Intermountain and in no event before the effective date of insurance required by Article 10 to be furnished by Contractor. In addition and without limitation of the foregoing, Contractor will not proceed with further Work or services after performing preconstruction services until Contractor receives a subsequent Notice to Proceed.

**4.7.2 Schedule Preparation.** Contractor, promptly after being awarded the Contract, will prepare and submit for Intermountain's and A/E's review a reasonably detailed CPM schedule for the Work. The schedule will indicate the order, sequence, and interdependence of all items known to be necessary to complete the Work including construction, procurement, fabrication, and delivery of materials and equipment, submittals and approvals of samples, shop drawings, procedures, or other documents. Work items of Intermountain, other Contractors, utilities and other third parties that may affect or be affected by Contractor will be included. If Intermountain is required, by the Contract Documents, to furnish any materials, equipment, or the like, to be incorporated into the Work by Contractor, Contractor will submit, with the first schedule submittal, a letter clearly indicating the dates that such

items are required at the Project site. The critical path should be identified, including the critical paths for interim completion dates and milestones. The CPM schedule will be developed using Primavera, MS Project, or Suretrack unless otherwise authorized by Intermountain Representative. Contractor's schedule will be updated at least once per month and submitted with each pay request. Contractor will maintain an original baseline schedule and will provide Intermountain monthly written reports indicating Contractor's compliance or noncompliance with the original schedule.

- 4.7.3 Initial Contract Time. Unless otherwise specified in the bidding documents, the initial Contract Time is the time identified in the Contractor's Agreement.
- 4.7.4 Interim Completion Dates and Milestones. The schedule must include contractually specified interim completion dates and milestones. The milestone completion dates indicated are considered essential to the satisfactory performance of this Contract and to the coordination of all Work on the Project. The milestone dates listed are not intended to be a complete listing of all Work under this Contract or of interfaces with other Project contractors.
- 4.7.5 Schedule Content Requirements. The schedule will indicate an early completion date for the Project that is no later than the Project's required completion date. The schedule, including all activity duration's will be given in calendar days. The Schedule will also indicate all of the following:
- a. Interfaces with the work of outside contractors (e.g., utilities, power and with any separate Contractor);
  - b. Description of activity including activity number/numbers;
  - c. Estimated duration time for each activity;
  - d. Early start, late start, early finish, late finish date, and predecessor/successors including stop-start relationships with lead and lag time for each activity;
  - e. Float time available to each path of activities;
  - f. Actual start date for each activity begun;
  - g. Actual finish date for each activity completed;
  - h. The percentage complete of each activity in progress or completed;
  - i. Identification of all critical path activities;
  - j. The critical path for the Project, with this path of activities being clearly and easily recognizable on the time-scaled network diagram. The path(s) with the least amount of float time must be identified. Unless otherwise authorized by Intermountain Representative, no more than 40% of all activities may be identified as critical path items. The relationship between non-critical activities and activities on the critical path will be clearly shown on the network diagram;
  - k. Unless otherwise authorized by Intermountain Representative, all activities on the schedule representing construction on the site may not have duration longer than fourteen (14) Days. Construction items that require more than fourteen (14) Days to complete must be broken into identifiable activities on the schedule with durations less than fourteen (14) Days. The sum of these activities represents the total length required to complete that construction item; and
  - l. Additional requirements as specified in the Supplemental General Conditions.
- 4.7.6 Intermountain's Right to Take Exceptions. Intermountain reserves the right to take reasonable exception to activity duration, activity placement, construction logic or time frame for any element of the Work to be scheduled.

- 4.7.7 Float Time. Float time is defined as the amount of time between the earliest start date and the latest start date or between the earliest finish date and the latest finish date of a chain of activities on the Schedule. By a proposal request or modification delivered to Contractor, Intermountain has the right to use the float time for non-critical path activities until Contractor has reallocated such time on a newly submitted schedule.
- 4.7.8 Initial Schedule Submission. No progress payments will be approved until Contractor has submitted a Project detailed CPM schedule for the entire project.
- 4.7.9 Updates. Before any approval of a pay request, Intermountain, A/E and Contractor will review Contractor's schedule compared to the Work completed. Intermountain approves the amount of Work completed as supported by the schedule of values and as verified by the determination of Work completed. If necessary, Contractor will then update and submit to Intermountain the schedule with the pay request; all of which in accordance with Intermountain's approval. All updates will be provided in electronic and hard copy formats. At each scheduled meeting with Intermountain Representative, Contractor will provide at minimum a "three week look ahead" with long lead items identified.
- 4.7.10 Schedule of Submittals. Contractor will prepare and keep current, for A/E's and Intermountain's review, a schedule of submittals required under the Contract Documents which is coordinated with Contractor's construction schedule and allows A/E a reasonable time to review the submittals. This submittal schedule is to be included as part of the construction schedule. Submittals requiring expedited review must be clearly identified as such in the schedule of submittals.
- 4.7.11 Schedule Recovery. If the Work represented by the critical path falls behind by more than seven (7) Days, the project schedule will be redone within fourteen (14) Days showing how Contractor will recover the time. A narrative that addresses the changes in the schedule from the previously submitted schedule will be submitted along with the schedule in both hard copy (appropriate report formats to be determined by Intermountain Representative) and electronic copy. Contractor will comply with the most recent schedules.
- 4.7.12 Schedule Changes and Modifications.
- a. *Contract Time Change Requires Modification*. The Contract Time may only be shortened or extended by a Modification fully executed by Intermountain.
  - b. *Contractor Changing Activity Durations*. Should Contractor, after approval of the complete detailed construction schedule, desire to change his plan of construction, he will submit his requested revisions to Intermountain and A/E along with a written statement of the revisions including a description of the sequence and duration changes for rescheduling the work, methods of maintaining adherence to intermediate milestones and the contract completion date and the reasons for the revisions. If the requested changes are acceptable to Intermountain, which acceptance will not be unreasonably withheld, they will be incorporated into the Schedule in the next reporting period. If after submitting a request for change in the Contract Schedule, Intermountain does not agree with the request, Intermountain will schedule a meeting with Contractor to discuss the differences.
  - c. *Changes in Contract Time*. The critical path schedule as the term is used in the provisions herein will be based on the current version of Contractor's schedule for the Project and accepted by Intermountain just before the commencement of the modification, asserted delay, suspension or interruption. If Contractor believes it is entitled to an extension of Contract Time under the Contract Documents, Contractor will submit a PCO in accordance with Article 7.2 to A/E and Intermountain Representative accompanied by an analysis of the requested time adjustment.

#### 4.7.13 Extensions of Time.

- a. If Substantial Completion of the Project is delayed because of any of the following causes, then the Contract Time will be extended by Modification for a period of time equal to such delay:
  - (i) Labor strikes or lock-outs;
  - (ii) Unusual delay in transportation;
  - (iii) Unforeseen governmental requests or requirements;
  - (iv) A Change in the Work resulting from an instruction by Intermountain or A/E to Contractor subject to the conditions set forth in Section 7.1.5;
  - (v) Unforeseen Subsurface Condition subject to the conditions set forth in Section 7.1.6; or
  - (vi) Any other event or circumstance caused by the willful or negligent act or omission of Intermountain or A/E subject to the conditions set forth in Section 7.1.6.
- b. Contractor will not be entitled to any compensation for delay described in Section 4.7.13, Paragraph a, subparagraphs (i), (ii), and (iii).
- c. In no event will any time extension or cost adjustment be given on account of delay which reasonably should have been anticipated by the Contractor or in circumstances where performance of the Work is, was, or would have been, delayed by any other cause for which the Contractor is not entitled to an extension.
- d. Adverse Weather delays. Completion time will not be extended for normal bad weather or any weather that is reasonably foreseeable at the time of entering into the contract. The time for completion as stated in the contract documents includes due allowance for calendar days on which Work cannot be performed due to weather conditions. The Contractor acknowledges that it may lose days due to weather conditions. Notwithstanding, the Contract Time may be extended (but at no cost to Intermountain) if all of the following are established by the Contractor:
  - (i) That the weather prevented Work from occurring that is on the critical path for the project based upon a critical path schedule previously submitted to Intermountain and to the extent accepted by Intermountain;
  - (ii) There are no concurrent delays attributed to the Contractor;
  - (iii) The Contractor took all reasonable steps to alleviate the impact of the weather and took reasonable attempts to prevent the delay and despite such reasonable actions of Contractor, the weather impacted the critical path as described above; and
  - (iv) One of the following occurred:
    1. The weather was catastrophic, such as a tornado, hurricane, severe wind storm, severe hail storm; or
    2. Based on the full history of information published from the closest station as indicated from the Western Regional Climate Center (Desert Research Institute 2215 Raggio Parkway Reno, Nevada 89512, and as may be described on the website at <http://www.wrcc.dri.edu/summary/>), one or more of the following occurred:
      - a. For any day between November 1 and March 31, the minimum temperature fell below the average minimum temperature plus the extreme low temperature recorded for the month divided by 2.
      - b. For any day between November 1 and March 31, the maximum temperature fell below the monthly average for the minimum temperature.
      - c. The daily precipitation exceeded 75% of the historical one day maximum for the month.

d. The snowfall for the month exceeded 175% of the historical average snow fall for the month.

Contractor will not be entitled to any compensation for Adverse Weather.

4.7.14 Time Extension Request. Unless a shorter time period is set forth herein or in other Contract Documents, any time extension will be requested by Contractor within twenty-one (21) Days after Contractor knew or should have known about the delay and will be supported by the critical path schedule analysis.

4.7.15 Delay in Completion of the Work.

- a. *Prior to Substantial Completion*. For each Day after the expiration of the Contract Time that Contractor has not achieved Substantial Completion, Contractor will pay Intermountain the amount set forth in the Agreement as liquidated damages for Intermountain's loss of use of the Project and the added administrative expense to Intermountain to administer the Project during the period of delay. In addition, Contractor will reimburse Intermountain for any additional Consultant's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Intermountain as a result of the delay. The parties have agreed on this liquidated damages provision because actual damages which will result from a delay in Substantial Completion cannot readily be ascertained at the time of execution of the Agreement and the parties wish to fix such damages as a their reasonable estimate of such actual damages, and not as a penalty. Intermountain may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Intermountain within ten (10) Days after receipt of a written request from Intermountain for payment
- b. *After Substantial Completion*. For each Day that Contractor exceeds the time allowed for completion of the remaining items set forth in the Certificate of Substantial Completion, Contractor will pay to Intermountain as liquidated damages for additional administrative expenses the amount set forth in the Agreement. In addition, Contractor will reimburse Intermountain for any additional Consultant's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Intermountain as a result of the delay in completing such items.
- c. *No Waiver of Intermountain's Rights*. Permitting Contractor to continue any part of the Work after the time fixed for completion or beyond any authorized extension thereof, will in no way operate as a waiver or estoppel on the part of Intermountain of any of its rights under the Contract Documents, including the right to liquidated damages or any other remedies or compensation.

**4.8 Documents and Samples at the Site; Certifying "As-Builts"**. Contractor will maintain at the site for Intermountain, one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked weekly to record changes and selections made during construction, as well as approved Shop Drawings, Product Data, Samples and similar submittals. These items will be available to A/E and will be delivered to A/E for submittal to Intermountain upon completion of the Work, signed by Contractor, certifying that they show complete and exact "as-built" conditions and location, stating sizes, kind of materials, vital piping, conduit locations and similar matters. All notes of encountered or changed conditions will be included.

#### **4.9 Shop Drawings, Product Data and Samples.**

- 4.9.1 Not Contract Documents. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The submittal will demonstrate, for those portions of the Work for which the submittal is required, the way Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.
- 4.9.2 Promptness. Contractor will review, approve and submit to A/E, Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work, or the activities of Intermountain or separate contractors.
- 4.9.3 Not Perform Until A/E Approves. Contractor will perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved in writing by A/E. Such Work will be in accordance with the approved submittals.
- 4.9.4 Representations by Contractor. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, Contractor represents that Contractor has determined and verified materials, field measurements and field construction criteria related thereto, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- 4.9.5 Contractor's Liability. Contractor will not be relieved of responsibility for deviations from the requirements of the Contract Documents by A/E's approval of Shop Drawings, Product Data, Samples or similar submittals unless Contractor has specifically informed A/E in writing of such deviation at the time of the submittal and A/E has given written approval to the specific deviation. Contractor will not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by A/E's review and comment.
- 4.9.6 Direct Specific Attention to Revisions. Contractor will direct specific attention in writing to all revisions on resubmitted Shop Drawings, Product Data, Samples or similar submittals, except those requested by A/E and indicated on previous submittals.
- 4.9.7 Informational Submittals. Informational submittals upon which A/E is not expected to take responsive action may be so identified in the Contract Documents.
- 4.9.8 Reliance on Professional Certification. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, Intermountain and A/E will be entitled to rely upon the accuracy and completeness of such calculations and certifications. If a professional stamp is required, the professional will be licensed in the State in which the Project is located unless otherwise approved by Intermountain in writing. Likewise, Contractor is entitled to rely upon the accuracy and completeness of the calculations made by A/E in developing the Contract Documents, unless a Contractor of ordinary skill and expertise for the type of Work involved would know that such is inaccurate or incomplete and therefore must immediately notify Intermountain in writing.

#### **4.10 Use of Site.**

- 4.10.1 In General.
  - a. Contractor will confine operations at the site to areas permitted by the Contract Documents, law, ordinances, resolutions, rules and regulations, and permits and will not unreasonably encumber the site with materials or equipment. Contractor will take all reasonable means to secure the site, protect the site and protect the Work from any damage. The site will be left free and clear of refuse, equipment, materials, etc. and the site will not be subject to spilled liquids and chemicals, toxic or otherwise. Should such an incident occur while Contractor has control of the site, Contractor will be responsible to clean the site and pay all associated costs, fines and penalties.

Notwithstanding this, Contractor is not responsible for any damage to the site or the Work to the extent caused by Intermountain or Intermountain's agents.

- b. Contractor recognizes that the Project site and the surrounding area is frequently visited by the public and is important to Intermountain's image and function and will maintain the premises free from debris and waste materials resulting from Construction. At the completion of Construction, Contractor will promptly remove construction equipment, tools, surplus materials, waste materials and debris.

4.10.2 Access to Neighboring Properties. Contractor will not, except as provided in the Contract Documents or with Intermountain's advance written consent when necessary to perform the Work, interfere with access to properties neighboring the Project site by the owners of such properties and their respective tenants, agents, invitees and guests.

**4.11 Access to Work.** Contractor will provide Intermountain and A/E access to the Work in preparation and progress, wherever located.

**4.12 Royalties and Patents.** Contractor will pay all royalties and license fees. Contractor will defend suits or claims for infringement of patent rights and will hold Intermountain and A/E harmless from loss on account thereof, but will not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents. However, if Contractor has reason to believe that the required design, process or product is an infringement of a patent, Contractor will be responsible for such loss unless such information is promptly furnished to Intermountain in writing.

**4.13 Indemnification.**

4.13.1 To the fullest extent permitted by law, Contractor will indemnify and hold harmless Intermountain and its affiliates, subsidiaries, officers, employees, agents, authorized volunteers (hereinafter the above listing of entities and persons is referred to as "indemnitees") from and against every kind and character of claims, liabilities, damages, losses, settlements, and expenses, including but not limited to attorneys' fees, consultant fees, expert fees, and other costs and expenses, and including without limitation those events covered under the blanket Contractual Liability Coverage required under the Contract Documents, arising out of or resulting from performance of the Work, including without limitation the work of all the Subcontractors and their employees, except to the extent that such liability arises out of the negligence of Intermountain, its representatives, agents, and employees. This indemnity includes, without limitation, indemnification of Intermountain from all losses or injury to Intermountain's property, except to the extent that such loss or injury arises out of the negligence of Intermountain, its representatives, agents, and employees. This indemnity applies, without limitation, to include Claims occurring both during performance of the Work and/or subsequent to completion of the Work. In the event that any Claim is caused in part by a party indemnified hereunder, that party will bear the cost of such Claim to the extent it was the cause thereof. In the event that a claimant asserts a Claim for recovery against any party indemnified hereunder, the party indemnified hereunder may tender the defense of such Claim to Contractor. If Contractor rejects such tender of defense and it is later determined that the negligence of the party indemnified hereunder did not cause all of the Claim, Contractor will reimburse the party indemnified hereunder for all costs and expenses incurred by that party in defending against the Claim. Contractor will not be liable hereunder to indemnify any party for damages resulting from the sole negligence of that party. Notwithstanding, Intermountain will have the right, at its option, to participate in the defense of any such action without relieving Contractor of any obligation hereunder.

4.13.2 In addition to the foregoing, Contractor will be liable to defend Intermountain in any lawsuit filed by any Subcontractor relating to the Project. Where liens have been filed against Intermountain's property, Contractor (and/or its bonding company which has issued bonds for the Project) will obtain lien releases and record them in the appropriate county and/or local jurisdiction and provide

Intermountain with a title free and clear from any liens of Subcontractors. In the event that Contractor and/or its bonding company are unable to obtain a lien release, Intermountain in its absolute discretion may require Contractor to provide a bond around the lien or a bond to discharge the lien, at Contractor's sole expense.

- 4.13.3 In addition to the foregoing, Contractor will indemnify and hold Intermountain harmless from any claim of any other contractor resulting from the performance, nonperformance or delay in performance of the Work by Contractor.
- 4.13.4 The indemnification obligation under this Article 4.13 will not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for Contractor or Subcontractor under workers' or workmen's compensation acts, disability benefits acts or other employee benefit acts.
- 4.13.5 Intermountain and Contractor waive all rights against each other for damages to the Work during construction to the extent covered by the applicable Builder's Risk Policy, except such rights as they may have to the proceeds of such insurance as set forth in the Contract. Contractor will require similar waivers from its Subcontractors, subconsultants, and agents, at any tier.

**4.14 Additional Services/Work.** It is understood and agreed by the parties hereto that no money will be paid to Contractor for additional labor or materials furnished unless a new contract in writing or a Modification hereof in accordance with the General Conditions and the Contract Documents for such additional labor or materials has been executed. Intermountain specifically reserves the right to modify or amend the Contract and the total sum due hereunder, either by enlarging or restricting the scope of the Work.

**4.15 Building Information Modeling.** Contractor will perform, throughout the Project, as requested by Intermountain and/or as otherwise required to execute the Project, building information modeling ("BIM") services and coordination among trades. Such BIM services are included in Contractor's Work and services and shall be provided by Contractor and Subcontractors without additional fee or charge to Intermountain. Contractor will provide BIM services using software acceptable to Intermountain.

## 5. SUBCONTRACTORS.

### 5.1 Award of Subcontracts and Other Contracts for Portions of the Work.

#### 5.1.1 Approval Required.

- a. Listing of Subcontractors will be as stated in the Contract Documents, including but not limited to the "Intermountain Subcontractors List Form".
- b. Contractor will not contract with a proposed person or entity to whom Intermountain has made a reasonable and timely objection. Contractor will not be required to contract with anyone to whom Contractor has made reasonable objection.

5.1.2 Business and Licensing Requirements. All Subcontractors used by Contractor will comply with all applicable business and licensing requirements.

5.1.3 Subsequent Changes. After the bid opening, Contractor may change its listed Subcontractors only in accordance with the Contract Documents and with written approval of the Director.

- a. Intermountain will pay the additional costs for an Intermountain requested change in Subcontractor if all of the following are met:
  - (i) If Intermountain in writing requests the change of a Subcontractor;
  - (ii) The original Subcontractor is a responsible Subcontractor that meets the requirements of the Contract Documents; and
  - (iii) The original Subcontractor did not withdraw as a Subcontractor on the project.
- b. In all other circumstances, Contractor will pay the additional cost for a change in a Subcontractor.



- 5.1.4 Bonding of Subcontractors. Subcontractors as identified by Intermountain in the procurement documents, may be required to submit performance and payment bonds to cover the full extent of their portion of the Work. This provision does not in any way limit the right of Contractor to have Subcontractors at any tier be required to have a performance and/or payment bond.
- 5.1.5 Unrelated Subcontractors / Contractor Self-Performed Work.
- a. Contractor will procure bids for subcontract work from at least three (3) qualified bidders unless Intermountain waives such requirement in writing. Except as provided in the following section, Contractor will enter into contracts with Subcontractors not owned, related to or controlled by Contractor to perform all portions of the Work. Subcontracts will contain payment provisions consistent with the Contract Documents and will not be awarded on the basis of cost plus a fee without the prior written consent of Intermountain.
  - b. If Contractor wishes to self-perform any portion of the Work or subcontract such portion of the Work to an entity owned or controlled by or related to Contractor, Contractor will:
    - 1) Advise Intermountain at least thirty (30) Days in advance of bid opening that Contractor wishes to self-perform such Work or subcontract it to an entity owned, controlled by or related to Contractor and request Intermountain's written approval thereof;
    - 2) Submit to Intermountain Contractor's or such related entity's bid at least seventy-two (72) hours prior to bid opening;
    - 3) Procure bids for such subcontract Work from at least three qualified bidders unless Intermountain waives such requirement in writing; and
    - 4) Abide by Intermountain's determination as to whether Contractor or another subcontractor will be used to perform such Work.
  - c. If Intermountain both approves Contractor to self-perform Work and approves Contractor proceeding without obtaining bids from other Contractors, then Contractor's overhead and profit on Work performed by Contractor's crews will not be more than the percentage fee, if any, stated in the Contractor's Agreement or such fee as agreed by Intermountain and Contractor by a written Modification executed prior to Contractor's commencing the applicable self-performed Work.

## **5.2 Subcontractual Relations.**

- 5.2.1 Comply with Contract Documents. By appropriate enforceable agreement, and to the extent it can be practically applied, Contractor will require each Subcontractor to be bound to Contractor by the terms of the Contract Documents, and to assume toward Contractor all the obligations and responsibilities which Contractor, by these Documents, assumes towards Intermountain and A/E.
- 5.2.2 Rights. Each Subcontractor agreement will preserve and protect the rights of Intermountain and A/E under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and will allow to the Subcontractor, unless specifically provided otherwise in the Subcontractor agreement, the benefit of all rights and remedies against Contractor that Contractor, by the Contract Documents, has against Intermountain.
- 5.2.3 Sub-Subcontractors. Contractor will require each Subcontractor to enter into similar agreements with its Subcontractors which complies with the requirements of Paragraphs 5.2.1 and 5.2.2 hereinabove.
- 5.2.4 Document Copies. Contractor will make available to each proposed Subcontractor, before execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be

bound. Subcontractors will similarly make copies of applicable portions of the Contract Documents available to their respective proposed Subcontractors.

**5.3 Contingent Assignment of Subcontracts.** Each subcontract agreement for a Subcontractor, at any tier for a portion of the Work, is hereby assigned by Contractor to Intermountain provided that the assignment is effective only after termination of the Contract by Intermountain for cause pursuant to Article 12.2 or stoppage of the Work by Intermountain pursuant to Article 12.5, and only for those subcontract agreements which Intermountain accepts by notifying the Subcontractor in writing. The subcontract will be equitably adjusted to meet the new conditions of the work.

## **6. PROTECTION OF PERSONS AND PROPERTY.**

### **6.1 Safety of Persons and Property.**

- 6.1.1 Contractor Responsibility. Contractor will be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. Contractor will take all reasonable precautions for the safety of, and will provide reasonable protection to prevent damage, injury or loss to:
- a. Employees on the Work and other persons who may be affected thereby;
  - b. The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of Contractor or a Subcontractor; and
  - c. Other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- 6.1.2 Safety Program, Precautions. Contractor will institute a safety program at the start of construction to minimize accidents. This program will continue to the final completion of the Project and conform to applicable laws and regulations including the Utah Occupational Safety and Health Rules and Regulations as published by the Utah Industrial Commission - UOSH Division. Contractor will post signs, erect barriers, and provide those items necessary to implement the safety program. As soon as Contractor proceeds with the Work, Contractor will have all workers and all visitors on the site wear safety hard hats, as well as all other appropriate safety apparel such as safety glasses and shoes, and obey all safety rules and regulations and statutes. Contractor will post a sign in a conspicuous location indicating the necessity of wearing hard hats and Contractor will loan such hats to visitors.
- 6.1.3 Compliance with Safety Laws. Contractor will give notices and comply with applicable laws, ordinances, rules, codes, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.
- 6.1.4 Erect and Maintain Safeguards. Contractor will erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including effective fences, posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.
- 6.1.5 Utmost Care. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, Contractor will exercise utmost care and carry on such activities under supervision of properly qualified personnel.
- 6.1.6 Prompt Remedy. Contractor will promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Paragraph 6.1.1 of these General Conditions caused in whole or in part by Contractor, a Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which Contractor is responsible under this Paragraph 6.1.1, except to the extent such damage or loss is directly due to errors in the Contract Documents or caused by agents or

employees of A/E or Intermountain. The foregoing obligations of Contractor are in addition to Contractor's obligations under the Contract Documents.

- 6.1.7 Safety Designee. Contractor will designate a responsible member of Contractor's organization at the site whose duty will be the prevention of accidents, damage, injury or loss. This person will be Contractor's superintendent unless otherwise designated by Contractor in writing to Intermountain and A/E.
- 6.1.8 Load Safety. Contractor will not load or permit any part of the construction or site to be loaded so as to endanger its safety.
- 6.1.9 Off-Site Responsibility. In addition to its other obligations under this Article 6, Contractor will, at its sole cost and expense, promptly repair any damage or disturbance to walls, utilities, streets, ways, sidewalks, curbs and the property of Intermountain and third parties (including municipalities and other governmental agencies) resulting from the performance of the Work, whether by it or by its Subcontractors at any tier. Contractor will not cause materials, including soil and debris, to be placed or left on streets or ways.
- 6.1.10 Emergencies. In an emergency affecting safety of persons or property, Contractor will act, at Contractor's discretion, to prevent threatened damage, injury or loss. Contractor will promptly notify Intermountain Representative of the action taken.

**6.2 Hazardous Materials.** In the event Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) or any other hazardous waste or substance which may endanger the health of those persons performing the Work or being on the site, Contractor will immediately stop Work in the area affected and immediately report the condition to Intermountain Representative and A/E by phone with a follow-up document in writing. The Work in the affected area will be resumed when written direction is provided by Intermountain Representative. Except to the extent provided otherwise in the Contract Documents or if the presence of hazardous materials is due to the fault of Contractor, Contractor will not be required to perform without Contractor's consent, any Work relating to asbestos, polychlorinated biphenyl (PCB) or any other hazardous waste or substance. Intermountain will procure a licensed abatement contractor qualified to remove the hazardous material. The abatement contractor will submit notification of demolition to the Utah Division of Air Quality. Abatement contractor will pay the notification fee. A copy of the hazardous material survey report will be available to all persons who have access to the construction site.

**6.3 Historical and Archeological Considerations.** In the event Contractor knows or should have known of any cultural, historical or archeological material that is either recognized as an item to be protected under Federal, State, or local law or regulation, or is an item of obvious value to Intermountain, Contractor will cease any work that would interfere with such discovery and immediately report the condition to Intermountain Representative and A/E by phone with a follow-up document in writing. Work will resume based upon the direction of Intermountain Representative. Contractor cooperation with any Intermountain recognized archaeologist or other cultural/historical expert is required.

**6.4 Contractor Liability.** If Contractor fails in any of its obligations in Articles 6.1 through 6.3 above, Contractor will be liable to any damages to Intermountain or any third party resulting from such noncompliance. Contractor will also be liable for any mitigation or restoration effort resulting from such noncompliance. To the extent all the following is met, Contractor may treat the discovery of such material similarly to an unforeseen condition:

- 6.4.1 The discovery of such material is reasonably unforeseeable given the site conditions that Contractor should have been aware;
- 6.4.2 The presence of such material was not identified in any part of the Contract Documents;

- 6.4.3 Contractor has undertaken all proper action to mitigate any impact of such discovery on the critical path or monies related to the Project;
- 6.4.4 The discovery affects the critical path or contract price from that which was contemplated by the Contract Documents; and
- 6.4.5 The requirements of 7.1.5 and the Contract documents are met.

## **7. MODIFICATIONS, REQUEST FOR INFORMATION, PROPOSED CHANGE ORDER, AND CLAIMS PROCESS.**

### **7.1 Modifications: In General.**

- 7.1.1 Types of Modifications and Limitations. Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or ASI, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. Contractor must have a written Modification executed by Intermountain under this Article 7 before proceeding with any Work sought to be an extra.
- 7.1.2 By Whom Issued. A Change Order or Construction Change Directive will be issued by Intermountain Representative. An ASI is issued by A/E. A/E will prepare Change Orders and Construction Change Directives with specific documentation and data for Intermountain's approval and execution in accordance with the Contract Documents, and may issue ASIs not involving an adjustment in the Contract Sum or an extension of the Contract Time which are not inconsistent with the intent of the Contract Documents.
- 7.1.3 Contractor to Proceed Unless Otherwise Stated. Changes in the Work will be performed under applicable provisions of the Contract Documents, and Contractor will proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or ASI.
- 7.1.4 Adjusting Unit Prices. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a PCO or Construction Change Directive that application of such unit prices to quantities of Work proposed will cause a substantial inequity to Intermountain or Contractor, the applicable unit prices may be equitably adjusted.
- 7.1.5 Changes in the Work Resulting From An Instruction by Intermountain or A/E to Contractor.
  - a. If Intermountain or A/E gives Contractor an instruction that modifies the requirements of the Contract Documents or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If compliance with the instruction affects the cost to Contractor to perform the Work, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in cost subject to the conditions set forth in Section 7.1.5, subparagraphs b through g. If compliance with the instruction delays Substantial Completion, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in Section 7.1.5, subparagraphs b through g and Section 4.7.13.
  - b. If Contractor receives an instruction from Intermountain or A/E that Contractor considers to be a Change in the Work, Contractor, before complying with the instruction, will notify A/E in writing that Contractor considers such instruction to constitute a Change in the Work. If A/E agrees that compliance with the instruction will constitute a Change in the Work, Contractor will furnish a proposal for a Modification in accordance with Section 7.1.5 subparagraphs c and d. within ten (10) Days.
  - c. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) as a result of an instruction by Intermountain or A/E, Contractor will furnish a proposal for a Change Order containing a price breakdown itemized as required by Intermountain. The breakdown will provide sufficient detail to allow Intermountain to determine any increase or decrease in Direct Costs as a result of compliance with the

instruction. Any amount claimed for subcontracts will be supported by a similar price breakdown and will itemize the Subcontractor's profit and overhead charges. Profit and overhead will be subject to the markup limits for additional work, changes, or other Modification set forth in the Contractor's Agreement. Amounts due Intermountain as a result of a credit change will be the actual net decrease in the Contractor's Direct Costs to perform the Work as a result of the Change in the Work. Overhead and profit for the Modification will be calculated based on the net increase or decrease in Contractor's Direct Costs resulting from the Change in the Work

- d. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an instruction from Intermountain or A/E, Contractor will include in its proposal justification to support Contractor's claim that compliance with the instruction will delay Substantial Completion.
- e. Upon receipt of Contractor's proposal for Modification, A/E and Intermountain will determine whether to proceed with the Change in the Work. If A/E and Intermountain determine to proceed with the Change in the Work, they will execute a Change Order, a Construction Change Directive or a Field Change as appropriate.
- f. Contractor agrees that if it complies with an instruction from Intermountain or A/E without first giving written notice to A/E as provided in Section 7.15, subparagraph b, and receiving a Change Order, Construction Change Directive or Field Change, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.
- g. If Contractor is instructed to perform work which it claims constitutes a Change in the Work but which Intermountain and A/E do not agree constitutes a Change in the Work, Contractor will comply with the instruction. Contractor may submit its claim for adjustment to the Contract Sum, the Contract Time, or both as a dispute pursuant to Section 7.7 within twenty-one (21) Days after compliance with the instruction. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 7.7 within twenty-one (21) Days after compliance with the instruction, then Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.
- h. Contractor agrees that it is responsible for submitting accurate cost and pricing data to support its Change Order Proposals. Intermountain will have the right to examine the Contractor's records to verify the accuracy and appropriateness of the pricing data used to price change order proposals.

**7.1.6 Change in the Work Resulting From An Event or Circumstance.**

- a. If an event or circumstance other than an instruction from Intermountain or A/E affects the cost to Contractor of performing the Work or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If the circumstance or event affects the cost to Contractor to perform the Work and is caused by a willful or negligent act or omission of Intermountain or A/E or an Unforeseen Subsurface Condition, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in Contractor's cost to perform the Work resulting from the event or circumstance, subject to the conditions set forth in Section 7.1.6, subparagraphs b through f. If the event or circumstance delays Substantial Completion and is described in Section 4.7.13, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in such section. If the circumstance or event delays Substantial Completion and is caused by a willful or negligent act or omission of Intermountain or A/E or an Unforeseen Subsurface Condition, then Contractor will

be compensated for costs incident to the delay in accordance with Section 7.1.6, subparagraphs b through g and Section 4.7.13.

- b. Contractor will not be entitled to any adjustment to the Contract Sum or other damages from Intermountain as a result of any event or circumstance unless the event or circumstance results from a willful or negligent act or omission of Intermountain or A/E.
- c. If a Change in the Work results from any event or circumstance caused by the willful or negligent act or omission of Intermountain or A/E or an Unforeseen Subsurface Condition, Contractor will give Intermountain Written Notice of such event or circumstance within twenty-four (24) hours after commencement of the event or circumstance so that Intermountain can take such action as is necessary to mitigate the effect of the event or circumstance. Contractor will not be entitled to any adjustment in either the Contract Time or the Contract Sum based on any damages or delays resulting from such event or circumstance during a period more than twenty-four (24) hours prior to Contractor giving such Written Notice to Intermountain.
- d. Contractor will submit in writing any claims for an adjustment in the Contract Time and/or the Contract Sum resulting from an event or circumstance within the time limits set forth below. In the event that Contractor fails to submit its claim in writing within the time limits set forth below, then Contractor agrees it will not be entitled to any adjustment in the Contract Time or the Contract Sum or to any other damages from Intermountain due to the circumstance or event and waives any claim therefor.
  - (i) Claims for an adjustment in the Contract Time due to Adverse Weather will be made within twenty-one (21) Days of the first Day of the occurrence of the Adverse Weather event in which the delay occurred.
  - (ii) Claims for an adjustment in the Contract Time and/or the Contract Sum due to any other circumstance or event will be submitted within seven (7) Days after the occurrence of the circumstance or event.
- e. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) because of an event or circumstance resulting from the willful or negligent act or omission of Intermountain or A/E or an Unforeseen Subsurface Condition, Contractor will furnish a proposal for a Change Order containing a price breakdown as described in Section 7.1.5, subparagraph c. Any amount claimed for increased labor costs as a result of the event or circumstance must be supported by a certified payroll. Any claim for rented equipment or additional material costs must be supported by invoices.
- f. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an event or circumstance, Contractor will include with its claim copies of daily logs, letters, shipping orders, delivery tickets, Project schedules, and other supporting information necessary to justify Contractor's claim that the event or circumstance delayed Substantial Completion.
- g. Within thirty (30) Days after receipt of Contractor's claim, A/E will either deny the claim or recommend approval to Intermountain. If Intermountain approves the claim, the adjustment in the Contract Time and/or Contract Sum will be reflected in a Change Order pursuant to Section 7.4 or a Construction Change Directive pursuant to Section 7.5. If Intermountain or A/E denies Contractor's claim, Contractor may submit its claim as a dispute pursuant to Section 7.7 within twenty-one (21) Days of receipt of the denial of the claim. If Contractor fails to submit its claim for resolution pursuant to Section 7.7 within the twenty-one (21) Day time period, then Contractor agrees it is not entitled to any adjustment in the Contract Time and/or Contract Sum or any other damages as a result of the event or circumstance and waives any claim therefor.

## **7.2 Contractor Initiated Requests.**

- 7.2.1 The Request for Information, RFI, Process and Time to File. Contractor may file an RFI with A/E regarding any concern which will assist Contractor in the proper completion of the Work including, but not limited to issues related to the Contract Documents, plans and specifications. The RFI will be filed with A/E in a timely manner so as not to prejudice Intermountain as to the quality, time or money related to the Work.
- 7.2.2 Proposed Change Order. Unless a shorter time period is set forth herein or in other Contract Documents, within twenty-one (21) Days after Contractor knows or should have known of a situation or concern where Contractor is going to request additional monies or time, Contractor must file a PCO with Intermountain Representative, or Contractor will be deemed to waive any right to claim additional monies or time related to such situation or concern. The PCO will include all available documentation supporting the PCO available to Contractor at the time of filing and Contractor will thereafter diligently pursue the supplementation(s) of such documentation and promptly deliver such supplementation(s) to Intermountain Representative.
- a. *Intermountain Representative Response.* One of the following may occur after a PCO is filed with Intermountain Representative:
- (i) Intermountain Representative, after considering any input by A/E, may reach an agreement with Contractor and issue a Change Order.
  - (ii) Intermountain, after considering any input by A/E, may issue a Construction Change Directive.
  - (iii) If Intermountain Representative, after considering any input by A/E, disagrees with Contractor's PCO, Intermountain representative may seek additional information or verification from Contractor, A/E or other sources, may negotiate with Contractor, may issue a Change Order upon such later agreement, may retract the PR, or may issue a Construction Change Directive. A/E must continually work with Intermountain in providing data, documentation and efforts to resolve the issues related to the PR.

**7.3 Proposal Request Initiated by Intermountain.** Intermountain may file a Proposal Request with Contractor seeking information, data and/or pricing relating to a change in the Contract Time and or monies owing for particular scope changes or other modifications to the Contract Documents. The PR will provide a time limit for Contractor to file a response with A/E and Intermountain Representative. If a proposal is not timely provided by Contractor, Intermountain may calculate the Change Order under Article 7.4.2 below. Upon such timely receipt of the proposal, one of the following will occur:

- 7.3.1 If Agreement, Change Order Issued. Intermountain Representative, after considering any input by A/E, may reach an agreement with Contractor and issue a Change Order.
- 7.3.2 If Disagreement. If Intermountain Representative disagrees with Contractor's proposal, after considering any input from A/E, Intermountain representative may seek additional information or verification from Contractor or other sources, may negotiate with Contractor, may issue a Change Order upon such later agreement, may retract the PR, or may issue a Construction Change Directive. If a Construction Change Directive is issued which identifies Intermountain representative's position in regard to the subject contract sum and/or time adjustment, Contractor must initiate the Claim resolution process provided for herein within twenty-one (21) Days of Contractor's receipt of the Construction Change Directive, or Contractor will be deemed to waive any such request for additional time or money as a result of the issuance of the Construction Change Directive. Such waiver will entitle Intermountain to convert the Construction Change Directive into a Change Order, whether or not executed by Contractor. If the Construction Change Directive leaves open the determination of additional time or money related to the directed change, then the time period for initiating the Claim resolution process will not accrue until such time as Intermountain has conveyed to Contractor a position as to the time and money owing as a result of the directed change.

#### **7.4 Evaluation of Proposal for Issuing Change Orders.**

- 7.4.1 Adjusting Sum Based Upon Agreement. If the Change Order provides for an adjustment to the Contract Sum, the adjustment will be based on the mutual agreement of Contractor and Intermountain, including any terms mandated by unit price agreements or other terms of the Contract Documents.
- 7.4.2 Intermountain Resolution of Sum and Standards in the Absence of an Agreement Under Paragraph 7.4.1. In the absence of an agreement under Paragraph 7.4.1 above, the adjustment will be based on an itemized accounting of costs and savings supported by appropriate data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Paragraph will be limited to the following:
- a. All direct and indirect costs of labor; including workers compensation insurance, social security and other federal and state payroll based taxes, and payroll based fringe benefits paid by Contractor so long as they are reasonable and no higher than that charged to other clients;
  - b. Costs of materials, on-site temporary facilities, supplies and equipment (except hand tools) required for or incorporated into the work;
  - c. Rental costs of machinery, equipment, tools (except hand tools), and on-site temporary facilities, whether rented from Contractor or others;
  - d. Costs of permits and other fees, sales, use or similar taxes related to the Work (with no markup);
  - e. Additional costs of field supervision and field office personnel directly attributable to the change; and
  - f. Overhead and profit by the markup limits in the Agreement for additional services or modifications which is not a penalty but a reasonable calculation agreed upon at the time of execution of the Agreement, and provided therein due to the fact that the actual amount due for this overhead and profit cannot easily be ascertained at the time of such execution. The markups set forth in the Agreement are to cover additional payment and performance bond premiums, insurance premiums, home office and on-site overhead and profit. Overhead and profit includes, but is not limited to Contractor's Project Manager and Cost Estimator. Each request for pricing will stand on its own and not be combined with other requests for pricing in determining the allowed markup. A particular request for pricing will include all items reasonably related together and determinable at the time of the request. If several unrelated requests for pricing are grouped together in a single Change Order, each request for pricing will be considered separately for purposes of calculating the markup.
- 7.4.3 Credits. The amount of credit to be allowed by Contractor to Intermountain for a deletion or change which results in a net decrease in the Contract Sum will be actual net cost as confirmed to Intermountain based upon corroboration by an appropriate source.

#### **7.5 Construction Change Directives.**

- 7.5.1 When Used and Contractor's Right to Challenge. A Construction Change Directive may be issued by Intermountain Representative in the case of a need for the Work to commence. If the Construction Change Directive leaves open the determination of additional time or money related to the directed change, then the Construction Change Directive will indicate the timeframe(s) in which further information is to be provided to resolve the matter. At any time that Intermountain and Contractor agree upon the time and money related to a Construction Change Directive, a Change Order will be executed by the parties. Additionally, the Construction Change Directive may be converted to a Change Order under Paragraph 7.2.2 or Article 7.3 above.
- 7.5.2 Proceed with Work and Notify Intermountain about Adjustment Method. Upon receipt of a Construction Change Directive, Contractor will promptly proceed with the change in the Work involved.



7.5.3 Interim Payments by Intermountain. Pending the final determination of the total cost of the Construction Change Directive, Intermountain will pay any undisputed amount to Contractor.

**7.6 A/E's Supplemental Instruction (Commonly referred to as an "ASI").** A/E may at any time that is consistent with maintaining the quality, safety, time, budget and function of the Work, issue to Contractor a supplemental instruction ("ASI") after approval from Intermountain Representative is obtained. Contractor must file with Intermountain Representative a PCO under Paragraph 7.2.2 above, within twenty-one (21) Days of Contractor's receipt of the ASI, or the Contractor will be deemed to have waived any right to additional time or monies as a result of such ASI.

**7.7 Resolution of Disputes.** If a dispute arises between the Parties regarding the Contract Documents which is not resolved by agreement between the parties, before a party may proceed with judicial action, the dispute must be submitted in writing to Intermountain's Vice President of Financial Strategy, Growth and Development, at 36 South State Street, Salt Lake City, Utah 84111. Upon receipt of such written submission, Intermountain will schedule within seven (7) Days an initial conference or meeting, and if necessary within an additional ten (10) Days thereafter a further conference or meeting, as set forth in the escalation process herein below.

7.7.1 Escalation Process. The Parties will arrange in-person meetings or telephone conferences at mutually convenient times and places, according to the levels and time schedules set forth below. The Parties will use reasonable and good faith efforts in this escalation process to respond promptly and to resolve the dispute. Such meetings or conferences will constitute settlement negotiations and any settlement proposal made pursuant to such meetings or conferences will not be admissible as evidence of liability.

<u>Levels and Representatives</u>	<u>Allotted Time Period from Notice or from Previous Level</u>
<u>Level 1</u>	
Contractor's Director level employee, and Intermountain's Director	7 Days
<u>Level 2</u>	
Vice President or higher level executive	10 Days

7.7.2 Judicial Action. In the event that the parties do not resolve their dispute pursuant to the escalation process, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the initial Level 1 conference/meeting or be time barred. Submission of the dispute under the escalation process as outlined above is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute under the escalation process, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorney fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses. Any such legal action must be brought exclusively in the state courts of the State of Utah or in the federal courts of the United States which are located in Salt Lake County, Utah. The Parties hereto hereby agree to submit to the exclusive jurisdiction and venue of such courts for the purposes hereof.

7.7.3 Continuation of Performance During Proceedings. Pending final resolution of a dispute hereunder, Contractor will proceed diligently with the performance of its obligations under the Contract Documents.

## **7.8 Payment of Claim.**

- 7.8.1 When a standalone component of a Claim has received a final determination, and is no longer subject to review or appeal, that amount will be paid in accordance with the payment provisions of the Contract Documents or judicial order.
- 7.8.2 When the entire Claim has received a final determination, and is no longer subject to review or appeal, the full amount will be paid within thirty-one (31) Days of the date of the final determination unless the work or services has not been completed, in which case the amount will be paid in accordance with the payment provisions of the Contract Documents to the point that the work or services is completed.
- 7.8.3 The final determination date is the earlier of the date upon which the claimant accepted the settlement in writing with an executed customary release document and waived its rights of appeal, or the expiration of the appeal period, with no appeal filed, or the determination made resulting from the final appeal.
- 7.8.4 Any final determination where Intermountain is to pay additional monies to Contractor will not be delayed by any appeal or request for judicial review by another party brought into the process by Intermountain as being liable to Intermountain.
- 7.8.5 Notwithstanding any other provision of the Contract Documents, payment of all or part of a Claim is subject to any set-off, claims or counterclaims of Intermountain.
- 7.8.6 Payment to Contractor for a Subcontractor issue (Claim) deemed filed by Contractor, will be paid by Contractor to the Subcontractor in accordance with the contract between Contractor and the Subcontractor.
- 7.8.7 The execution of a customary release document related to any payment may be required as a condition of making the payment.

## **7.9 Allocation of Costs of Claim Resolution Process.**

- 7.9.1 Except for attorneys' fees and expert fees, and unless otherwise agreed to by the parties to the Claim, the costs of resolving the Claim will be allocated among the parties on the same proportionate basis as the determination of financial responsibility for the Claim. The costs of resolving the Claim that are subject to allocation include the claimant's filing fee, the costs of any person(s) evaluating the Claim, the costs of making any required record of the process, and any additional testing or inspection procured to investigate and/or evaluate the Claim.
- 7.9.2 The prevailing party in any Claim, judicial action or other proceeding is entitled to recover its reasonable attorneys' fees, expert and other fees, and costs incurred in the proceeding, in addition to any other relief to which that party may be entitled.

**7.10 Alternative Procedures.** To the extent otherwise permitted by law, if all parties to a Claim agree in writing, a protocol for resolving a Claim may be used that differs from the process described in this Article 7.

## **8. PAYMENTS AND COMPLETION.**

**8.1 Schedule of Values.** With the first Application for Payment, Contractor will submit to A/E and Intermountain Representative a schedule of values allocated to all the various portions of the Work. The Schedule of Values will be submitted on the form approved and provided by Intermountain. A/E will make recommendations to Intermountain Representative regarding the Schedule of Values including any suggested modifications. When approved, including any approved modifications, by Intermountain Representative, it will be the basis for future Contractor Applications for Payments. Contractor will not be entitled to payment until receipt and acceptance of the Schedule of Values.

## 8.2 Applications for Payment.

8.2.1 In General. The following general requirements will be met:

- a. Not more than once a month, Contractor will submit to A/E an itemized Application for Payment for Work completed in accordance with the schedule of values and that reflects retainage as provided for in the Contractor's Agreement. Contractor's Applications for Payment will include conditional or final lien waivers (as applicable), in the forms attached to Contractor's Agreement for itself and from each Subcontractor requesting payment, covering all payments requested in the Application for Payment. The Application for Payment will be on a form provided by Intermountain.
- b. Such application will be supported by such data substantiating Contractor's right to payment as Intermountain or A/E may require. This data may include, but is not limited to, copies of requisitions from Subcontractors.
- c. Such applications may include requests for payment pursuant to approved Change Orders or Construction Change Directives.
- d. Such applications may not include requests for payment for portions of the Work performed by a Subcontractor when Contractor does not intend to pay to a Subcontractor because of a dispute or other reason.
- e. In executing the Application for Payment, Contractor will attest that Subcontractors involved with prior applications for payment have been paid, unless Contractor provides a detailed explanation why such payment may not have occurred. Intermountain reserves the right to require Contractor to submit a payment waiver from one or more Subcontractors.

8.2.2 Payment for Material and Equipment. Unless otherwise provided in the Contract Documents, payments will be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by Intermountain and A/E, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site will be conditioned upon compliance by Contractor with procedures satisfactory to Intermountain to establish Intermountain's title to such materials and equipment or otherwise protect Intermountain's interest, and will include applicable insurance, storage and transportation to the site for such materials and equipment stored off the site. Intermountain may require copies of invoices or other suitable documentation.

8.2.3 Warranty of Title. Contractor warrants that title to all Work covered by an Application for Payment will pass to Intermountain no later than the time for payment. Contractor further warrants that upon submittal of an Application for Payment, all Work for which Certificates for Payment have been previously issued and payments received from Intermountain will, to the best of Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of Contractor, Subcontractors, or other persons or entities making a claim by reason of having provided labor, materials and/or equipment relating to the Work.

8.2.4 Retainage and Holdback by Intermountain.

- a. *Holdback by Intermountain.* Notwithstanding anything to the contrary contained in the Contract Documents, Intermountain may, as a result of the Claim resolution process, withhold any payment to Contractor hereunder if and for so long as Contractor fails to perform any of its obligations hereunder or otherwise is in default under any of the Contract Documents.
- b. *Intermountain's Right to Withhold and Use Funds.* Intermountain may withhold from payment to Contractor such amount as, in Intermountain's judgment, may be necessary to pay just claims against Contractor or Subcontractors at any tier for labor and services rendered and materials furnished in and about the Work. Intermountain may apply such withheld amounts for the

payment of such claims in Intermountain's discretion. In so doing, Intermountain will be deemed the agent of Contractor and payment so made by Intermountain will be considered as payment made under the Contract by Intermountain to Contractor. Intermountain will not be liable to Contractor for any such payment properly made. Such withholdings and payments may be made without prior approval of Contractor and may also be made before any determination as a result of any dispute, Claim or litigation. However, Contractor will be notified before any such withholding and will be given an opportunity to inform Intermountain as to any reason why the withholding will not occur.

- c. *Statutory Retainage.* Notwithstanding and in addition, retainage in the amount of 5% will be withheld from each payment to Contractor for any Work under the Contract. The retainage, including any additional retainage imposed and the release of any retainage, will be in accordance with Intermountain policies, including restrictions of retainage regarding Subcontractors and the distribution of interest earned on the retention proceeds. After Contractor achieves Substantial Completion and submits its payment request for retained funds and provides statutory Conditional Waiver and Release documents executed by all subcontractors and suppliers having claim against the retained funds, Intermountain will pay any unpaid statutory retention, less any offsets or withholdings for specific deficiencies or disputes, within forty-five (45) Days. Notwithstanding the foregoing, Intermountain may (but is not obligated to), in its sole discretion, release from time to time any portion of retention funds for early completing subcontractors and/or otherwise reduce the overall retention funds withheld.
- d. *Intermountain Not Responsible for Contractor's Retention Requirements.* Intermountain will not be responsible for enforcing Contractor's obligations under Utah law in fulfilling the retention law requirements with Subcontractors at any tier.

8.2.5 Reimbursement to Intermountain. Notwithstanding any other provision of the Contract, Contractor will reimburse Intermountain for the portion of any expenses paid by Intermountain to Contractor, which is attributable to Contractor's breach of its duties under the Contract, including the breach of any duty by any Subcontractor or supplier at any tier or anyone for whom Contractor may be liable.

### **8.3 Certificates for Payment.**

8.3.1 Issued by A/E. A/E will within ten (10) Days after receipt of Contractor's Application for Payment, either issue to Intermountain a Certificate for Payment, with a copy to Contractor, for such amount as A/E determines due, or notify Contractor and Intermountain in writing of A/E's reasons for withholding certification in whole or in part as provided in Paragraph 8.4.1. If A/E fails to act within this ten (10) Day period, Contractor may file the Application for Payment directly with Intermountain Representative and Intermountain will thereafter have thirty-one (31) Days from the date of Intermountain's receipt to resolve the amount to be paid and to pay the undisputed amount. The accuracy of Contractor's Applications for Payment will be Contractor's responsibility, not A/E's.

8.3.2 A/E's Representations. A/E's issuance of a Certificate for Payment will constitute a representation to Intermountain that to the best of A/E's knowledge, information and belief, based upon A/E's observations at the site, the data comprising the Application for Payment, and what is reasonably inferable from the observations and data, that the Work has progressed to the point indicated in the Application for Payment and that the quality of the work is in accordance with the Contract Documents. The foregoing representations are subject to minor deviations from the Contract Documents correctable before completion and to specific qualifications expressed by A/E. The issuance of a Certificate for Payment will further constitute a representation that Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that A/E has (a) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (b) reviewed construction means, methods, techniques, sequences or procedures, (c) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by Intermountain to substantiate Contractor's right to

payment, (d) ascertained how or for what purpose Contractor used money previously paid on account of Contract Sum, or (e) any duty to make such inquiries.

- 8.3.3 Contractor Respond to Financial Responsibility and Related Requests, Waivers, Releases, Bonds. Contractor will respond immediately to any inquiry in writing by Intermountain as to any concern of financial responsibility and Intermountain reserves the right to request any waivers, releases or bonds from Contractor in regard to any rights of Subcontractors (including suppliers) at any tier or any third-party before any payment by Intermountain to Contractor.

#### **8.4 Decisions to Withhold Certification.**

8.4.1 When Withheld. A/E may decide not to certify payment and may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect Intermountain, if in A/E's judgment the representations to Intermountain required in Paragraph 8.3.2 above cannot be made. If A/E is unable to certify payment in the amount of the Application, A/E will notify Contractor and Intermountain as provided in Paragraph above. If Contractor and A/E cannot agree on a revised amount, A/E will promptly issue a Certificate for Payment for the amount to which A/E makes such representations to Intermountain. A/E may also decide not to certify payment or, because of subsequently discovered evidence or observations, may nullify the whole or part of a Certificate for Payment previously issued, to such extent as may be necessary in A/E's opinion to protect Intermountain from loss because of:

- a. Defective Work not remedied;
- b. Third party claims filed or reasonable evidence indicating probable filing of such claims;
- c. Failure of Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- d. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- e. Damage to Intermountain or another contractor;
- f. Reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- g. Failure to carry out the Work in accordance with the Contract Documents.

8.4.2 Certification Issued When Reasons for Withholding Removed. When the reasons stated in Paragraph 8.4.1 for withholding certification are removed, certification will be made for such related amounts.

8.4.3 Continue Work Even If Contractor Disputes A/E's Determination. If Contractor disputes any determination by A/E or the result of the Claim resolution process with regard to any Certification of Payment, Contractor nevertheless will expeditiously continue to prosecute the Work.

8.4.4 Intermountain Not in Breach. Intermountain will not be deemed to be in breach of this Contract by reason of the withholding of any payment pursuant to any provision of the Contract Documents provided Intermountain's action or such withholding is consistent with the results of the dispute resolution process.

#### **8.5 Progress Payments.**

8.5.1 In General, Interest on Late Payments.

- a. Except as provided in Paragraph 8.3.1, Intermountain will pay any undisputed amount within thirty-one (31) Days of satisfaction of the following requirements: (i) Contractor has submitted the application for payment; (ii) A/E has issued to Intermountain a Certificate recommending payment; and (iii) Contractor has obtained conditional or unconditional waiver and release

documents executed by all of Subcontractors performing work and/or providing materials covered by the Contractor's payment request. In no event will Intermountain be required to pay any disputed amount.

- b. Except as otherwise provided by law, if any payment is made more than sixty (60) Days after receipt by Intermountain of the applicable invoice (with any required supporting documentation), the late payment will bear interest from the due date until payment is made at the rate of five percent (5%) per annum.

- 8.5.2 Contractor and Subcontractor Responsibility. Contractor will promptly pay each Subcontractor, upon receipt of payment from Intermountain, out of the amount paid to Contractor on account of such Subcontractor's portion of the Work, the amount to which this Subcontractor is entitled. Contractor will, by appropriate agreement with each Subcontractor, require each Subcontractor to make payment to its Subcontractors in a similar manner.
- 8.5.3 Information Furnished by A/E Or Intermountain to Subcontractor. A/E or Intermountain will, on request, furnish to the Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by Contractor and action taken thereon by A/E and Intermountain on account of portions of the Work done by such Subcontractor.
- 8.5.4 Intermountain and A/E Not Liable. Neither Intermountain nor A/E will have an obligation to pay, monitor or enforce the payment of money to a Subcontractor, except to the extent as may otherwise be required by law.
- 8.5.5 Certificate, Payment or Use Not Acceptance of Improper Work. A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by Intermountain will not constitute acceptance of Work that is not in accordance with the Contract Documents.

**8.6 Payment upon Substantial Completion.** Upon Substantial Completion of the Work or designated portion thereof and upon application by Contractor and certification by A/E, Intermountain will make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as provided in the Contract Documents. To the extent allowed by law, Intermountain may retain up to 200% of the fair market value of the work that has not been completed in accordance with the Contract Documents.

### **8.7 Partial Occupancy or Use.**

- 8.7.1 In General. Intermountain may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with Contractor, and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is Substantially Complete, provided Intermountain and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of the warranties required by the Contract Documents. When Contractor considers a portion to be substantially complete, Contractor will prepare and submit a list to A/E as previously provided for herein. Consent of Contractor to partial occupancy or use will not be unreasonably withheld. Contractor will have continuing responsibility to protect the unoccupied portions of the site and the Work during such partial occupancy and will be responsible for damage except to the extent caused solely by Intermountain during such partial occupancy or use.

The stage of progress of the Work will be determined by written agreement between Intermountain and Contractor.

- 8.7.2 Inspection. Immediately before such partial occupancy or use, Intermountain, Contractor and A/E will jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

- 8.7.3 Not Constitute Acceptance. Except to the extent it is agreed upon in writing by Intermountain, partial occupancy or use of a portion or portion of the Work will not constitute acceptance of Work not complying with the requirement of the Contract Documents.

## **8.8 Final Payment.**

- 8.8.1 Certificate for Payment. A/E's final Certificate for Payment will constitute a further representation that the conditions listed in Paragraph 8.8.2 as precedent to Contractor's being entitled to final payment have been fulfilled.
- 8.8.2 Conditions for Final Payment. Neither final payment nor any remaining retained percentage will become due until Contractor submits to A/E the following to the extent required by Intermountain Representative:
- a. A final payment request;
  - b. Waiver and release upon final payment documents executed by all of the Subcontractors performing work and/or providing materials covered by the Contractor's final payment request;
  - c. All manufacturers' and other guaranties and warranties, properly signed and endorsed to Intermountain, that are required by the Contract Documents that extend for a period beyond one year after substantial completion. (Delivery of such guaranties and warranties will not relieve Contractor for any obligation assumed under any other provision of the Contract Documents.);
  - d. An affidavit that payrolls, bills for material and equipment, and other indebtedness connected with the Work for which Intermountain's property might be responsible or encumbered (less amounts withheld by Intermountain) have been paid or otherwise satisfied;
  - e. A current or additional certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least thirty (30) Days prior written notice, by certified mail, return receipt requested, has been given to Intermountain;
  - f. A written statement that Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents;
  - g. If requested by surety in a timely manner or by Intermountain, consent of surety, to final payment;
  - h. Up to date as built Drawings certified by Contractor as accurate and complete, Specifications, Addenda, Change Orders and other Modifications maintained at the site; the warranties, instructions, operation and maintenance manuals, and training videos required to be furnished by the Contract Documents;
  - i. Other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by Intermountain. If a Subcontractor refuses to furnish a release or waiver required by Intermountain, Intermountain may require consent of surety to the final payment. If such liens, claims, security interests or encumbrances remain unsatisfied after payments are made, Contractor will refund to Intermountain all money that Intermountain may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees; and
  - j. A written statement demonstrating how Contractor will distribute interest earned on retention to Subcontractors as required by Section 13.8.5, U.C.A.

In addition, A/E must declare to Intermountain in writing that the Work is complete. If the aggregate of previous payments made by Intermountain exceeds the amount due Contractor, Contractor will reimburse the difference to Intermountain within ten (10) Days of Intermountain's request.

- 8.8.3 Waiver of Claims: Final Payment. The making of final payment will not constitute a waiver of Claims or other rights by Intermountain.
- 8.8.4 Waiver by Accepting Final Payment. Acceptance of final payment by Contractor or a Subcontractor will constitute a waiver of Claims by that payee except those Claims previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.
- 8.8.5 Time of Repose and Waiver. In addition and notwithstanding, claims and invoices for work, equipment, services, or materials that are not submitted to Intermountain within one (1) year of Substantial Completion of the Project are completely void and unenforceable as against Intermountain. Contractor and all Subcontractors hereby waive all rights and claims against Intermountain attendant such claims and invoices, and Contractor will contractually obligate each Subcontractor to waive all rights and claims against Intermountain attendant such claims and invoices. This provision imposes an absolute cut off on the timing for submitting such claims and invoices; this provision does not lengthen any timing requirements in the Contract Documents.

## **9. TESTS AND INSPECTIONS, SUBSTANTIAL AND FINAL COMPLETION, UNCOVERING, CORRECTION OF WORK, AND GUARANTY PERIOD.**

### **9.1 Tests and Inspections.**

- 9.1.1 In General. Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations, resolutions or orders of public authorities having jurisdiction will be made at an appropriate time. Unless otherwise specifically set forth in the Contract Documents or agreed to by Intermountain in writing, Intermountain will contract for such tests, inspections and approvals with an independent entity, or with the appropriate public authority, and Intermountain will bear all related costs of tests, inspections and approvals except as provided below. If any of the Work is required to be inspected or approved by the terms of the Contract Documents or by any public authority, Contractor will, at least two working days before the time of the desired inspection, and following the procedures established by Intermountain, request such inspection or approval to be performed. Contractor will give A/E timely notice of when and where tests and inspections are to be made so that A/E may observe such procedures.
- 9.1.2 Failure of An Inspector to Appear. Work will not proceed without any required inspection and the associated authorization by Intermountain to proceed unless the following procedures and requirements have been met:
- a. The inspection or approval was requested in a timely manner as provided in Paragraph 9.1.1;
  - b. Contractor received written confirmation from the inspection entity that the inspection was scheduled;
  - c. Contractor has contacted or attempted to contact the inspector to confirm that the inspector is unable to perform the inspection as scheduled;
  - d. If the inspector has confirmed that it is unable to perform the inspection as scheduled or if Contractor is unable to contact the inspector, Contractor will attempt to contact Intermountain Representative for instruction; and Contractor has documented the condition of the work before being covered through photos or other means.
- 9.1.3 Nonconforming Work. If such procedures for testing, inspection or approval under Paragraph 9.1.1 reveal failure of portions of the Work to comply with the requirements established by the Contract Documents, Contractor will bear all costs made necessary by such failure including those of repeated procedures and compensation for Intermountain's expenses, including the cost of retesting for verification of compliance if necessary, until Intermountain accepts the Work in question as complying with the requirements of the Contract Documents.
- 9.1.4 Certificates. Required certificates of testing, inspection or approval will, unless otherwise required by the Contract Documents, be secured by Contractor and promptly delivered to A/E.



- 9.1.5 A/E Observing. If A/E is to observe tests, inspections or approvals required by the Contract Documents, A/E will do so with reasonable promptness and, where practicable, at the normal place of testing.
- 9.1.6 Promptness. Tests, inspections and arrangements for approvals conducted pursuant to the Contract Documents will be made promptly to avoid unreasonable delay in the Work.

## 9.2 Inspections: Substantial and Final.

- 9.2.1 Substantial Completion Inspection. Before requesting a substantial completion inspection, Contractor will prepare a comprehensive initial punchlist, including unresolved items from prior inspections, for review by Intermountain and A/E to determine if the Project is ready for a substantial completion inspection. If Intermountain determines that the initial punchlist indicates that the Project is not substantially complete, the initial punchlist will be returned to Contractor with written comments. If Intermountain determines that the initial punchlist indicates that the Project may be substantially complete, A/E will promptly organize and perform a Substantial Completion inspection in the presence of Intermountain and all appropriate authorities.
- a. If A/E reasonably determines that the initial punchlist prepared by Contractor substantially understates the amount of the Work remaining to be completed and the Project is not substantially complete, A/E will report this promptly to Intermountain, and upon concurrence of Intermountain, Contractor will be assessed the costs of the inspection and punchlist preparation incurred by A/E and Intermountain.
  - b. When the Work or designated portion thereof is Substantially Complete, A/E will prepare a Certificate of Substantial Completion which will establish the date of Substantial Completion; will establish responsibilities of Intermountain and Contractor for security, maintenance, heat, utilities, damage to the work and insurance; and will fix the time within which Contractor will finish all items on the punchlist accompanying the Certificate. The Certificate of Substantial Completion will require approval by Intermountain Representative. If there is a punchlist, Contractor will proceed promptly to complete and correct items on the list. Failure to include an item on the punchlist does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents.
  - c. Warranties required by the Contract Documents will commence on the date of Substantial Completion of the Work or designated portion thereof except to the extent as provided otherwise in the Contract Documents or if such warranty is related to an item where the work is not complete. Such warranty documents will state the length of the warranty, which must comply with the Contract Documents.
  - d. The Certificate of Substantial Completion will be submitted by A/E to Intermountain and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.
  - e. Except to the extent Intermountain Representative otherwise approves in advance and in writing, Contractor will submit the following documents in order to achieve Substantial Completion: written warranties, guarantees, operation and maintenance manuals, and all complete as-built drawings. Contractor must also provide or obtain any required approvals for occupancy. Contractor is responsible for the guaranty of all Work, whether performed by it or by its Subcontractors at any tier.
- 9.2.2 Final Completion Inspection. Before requesting a final inspection, Contractor will verify all punchlist items are corrected/completed. Once all punchlist items are corrected/completed Contractor will notify Intermountain and request a final inspection. Intermountain will notify A/E and perform a final inspection. Two final inspections may be allowed due to required weather changes required to complete some items. When all punchlist items are completed a final pay request will be provided by Contractor, authorized by A/E and processed by Intermountain.

### **9.3 Uncovering of Work.**

- 9.3.1 Uncover Uninspected Work. Except as provided in Paragraph 9.3.3, if a portion of the Work is covered before an Inspector's approval to proceed, it must, be uncovered for the Inspector's inspection and be replaced at Contractor's expense without change in the Contract Time.
- 9.3.2 Observation before Covering. Except as provided in Paragraph 9.3.3, if Intermountain or A/E has requested in writing to observe conditions before any Work being covered or if such observation is specified in the Contract Documents, and the Work is covered without such observation, Contractor will be required to uncover and appropriately replace the Work at Contractor's expense without change in the Contract Time. If Contractor requests an inspection and Intermountain or A/E, including any inspector of each, does not appear, Contractor will immediately notify Intermountain of such lack of appearance, but will not cover the Work without such inspection.
- 9.3.3 When an Inspector Fails to Appear Or A/E Or Intermountain Did Not Make Prior Request. If Work is performed by Contractor without an inspection as provided in Paragraph 9.1.2 or if a portion of the Work has been covered which A/E or Intermountain has not specifically requested to observe before its being covered or such observation is not specified by the Contract Documents, A/E or Intermountain may request to see such Work and it will be uncovered by Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement, will, by appropriate Change Order, be charged to Intermountain. If such Work is not in accordance with the Contract Documents, Contractor will pay such costs unless the condition was caused by Intermountain or a separate contractor in which event Intermountain will be responsible for payment of such costs.

### **9.4 Correction of Work and Guaranty Period.**

- 9.4.1 Contractor Correct the Work. Contractor will correct Work rejected by A/E, Inspector or Intermountain, or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. Contractor will bear the costs of correcting such rejected Work, including additional testing and inspections and compensation for A/E's and Inspector's services and expenses made necessary thereby.
- 9.4.2 Guaranty and Correction after Substantial Completion. If within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Paragraph 9.2.1 or by terms of an applicable special warranty or guaranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, including failure to perform for its intended purpose, Contractor will correct it promptly after receipt of written notice from Intermountain to do so unless Intermountain has previously given Contractor a written acceptance of such condition. The period of one year will be extended with respect to portions of the Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This obligation of Contractor under this Paragraph 9.4.2 will be operative notwithstanding the acceptance of the Work under the Contract, the final certificate of payment, partial or total occupancy and/or termination of the Contract. Intermountain will give notice of observed defects with reasonable promptness, however, failure to give such notice will not relieve Contractor of its obligation to correct the Work at the cost that Contractor would have incurred if Intermountain did so report with reasonable promptness. All corrected Work will be subject to a one-year guaranty period the same in all respects as the original Work, except that such guaranty period will commence from the time of Substantial Completion of the corrected Work. This guaranty period does not affect Intermountain's right to pursue any available remedies against Contractor.

9.4.3 Removal of Work.

- a. Contractor will promptly remove from the premises all Work that Intermountain and/or A/E determines as being in nonconformance with the Contract Documents, whether incorporated or not.
- b. Contractor will promptly replace and re-execute the Work in accordance with the Contract Documents and without expense to Intermountain.
- c. Contractor will bear the expense of correcting destroyed or damaged construction, whether completed or partially completed, of Intermountain or of other contractors destroyed or damaged by such removal or replacement.
- d. If Contractor does not remove such rejected Work within a reasonable time, fixed by written notice, Intermountain may have the materials removed and stored at the expense of Contractor.
- e. If Contractor does not correct the nonconforming Work within a reasonable time, fixed by written notice, Intermountain may correct it in accordance with Paragraph 12.2.2 of these General Conditions.

9.4.4 Not Limit Other Obligations. Nothing contained in this Article 9.4 will be construed to establish a period of limitation with respect to other obligations which Contractor may have under the Contract Documents. Establishment of the time period of one year as described in Paragraph 9.4.2 relates only to the specific obligation of Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations other than specifically to correct the Work.

**9.5 Additional Warranties.**

9.5.1 In General. In addition to any other provisions of this Article 9, the following warranties will apply:

- a. Contractor warrants to Intermountain that materials and equipment furnished under the Contract will be of good quality and new, except to the extent otherwise required or expressly permitted by the Contract Documents.
- b. Contractor also warrants to Intermountain that the Work will be free from defects not inherent in the quality required or permitted and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered Defective at Intermountain's option.

9.5.2 Correction of Work.

- a. Contractor will promptly correct any portion of the Work which is rejected by A/E, the inspector, or Intermountain, or which fails to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor will bear the cost of correcting such rejected Work, including additional testing and inspection costs, compensation for A/E's services, and any other expenses made necessary thereby. Such costs will in no way be payable by Intermountain and will not increase the Contract Sum.
- b. Contractor will remedy any Defects due to faulty materials, equipment, or workmanship which appear within a period of one (1) year from the date of Substantial Completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents. Contractor will pay all costs of correcting faulty work, including additional A/E fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses when incurred. Such costs will in no way be payable by Intermountain and will not increase the Contract Sum.

- c. Nothing in the Contract Documents will be construed to establish a period of limitation within which Intermountain may enforce the obligation of Contractor to comply with the Contract Documents. The one (1) year period specified in paragraph 9.5.2(2) has no relationship to the time within which Intermountain may enforce compliance with the Contract Documents, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations.

9.5.3 Exclusion. Unless due to the negligent or intentional act or omission of Contractor or those under Contractor's control, or as otherwise stated in the Contract Documents, Contractor's guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage.

9.5.4 Furnish Evidence on Request. If requested by A/E or Intermountain, Contractor will furnish satisfactory evidence as to the type and quality of materials and equipment.

**9.6 Acceptance of Nonconforming Work**. If Intermountain prefers to accept Work which is not in accordance with the requirements of the Contract Documents, Intermountain may do so in writing instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment will be effected whether or not final payment has been made. Without limitation, usage by Intermountain or A/E of mechanical devices, machinery, apparatus, equipment, or other work or materials supplied under the Contract Documents before written acceptance by Intermountain, will not constitute Intermountain's acceptance.

## 10. INSURANCE AND BONDS.

**10.1 Insurance**. To protect against liability, loss and/or expense arising in connection with the performance of services described under the Contract Documents, Contractor will obtain and maintain in force as set forth below in section 10.1.9 without interruption, the following stated insurance, in a form and content satisfactory to Intermountain, from insurance companies authorized to do business in the State in which the Project is located with an A.M. Best's Rating of A- or better and Class VII or better. Contractor will require all Subcontractors to have and maintain similarly required policies. All of the following listed insurance coverages will be provided by Contractor.

10.1.1 Contractor's Commercial General Liability Insurance. Contractor will maintain coverage, with ISO Form CG 00 01 or other policy form satisfactory to Intermountain, on an occurrence basis, including coverage for Premises-Operations, Independent Contractors' Protective, Products-Completed Operations, Contractual Liability, Personal Injury, and Broad-Formed Property Damage (including coverage for Explosion, Collapse, and Underground hazards), which will provide primary coverage to the additional insureds (Intermountain and the A/E) in the event of any occurrence, claim, or suit, with per occurrence and annual aggregate policy limits of at least as follows:

\$2,000,000	General Aggregate;
\$2,000,000	Products-Completed Operations Aggregate;
\$1,000,000	Personal and Advertising Injury;
\$1,000,000	Each Occurrence.

Intermountain reserves the right to require additional coverage limits of liability from that stated above. Intermountain also reserves the right to require project specific insurance, and if such right has been exercised it will be indicated in the Contract Documents.

10.1.2 Excess and Umbrella Liability Insurance. Contractor will maintain excess and liability insurance with coverage at least as broad as the underlying liability insurance described in this section, written on an occurrence basis with per occurrence and annual aggregate policy limits based on the following chart, unless modified by mutual agreement of the parties,

Small Project (\$2,000,000 or less)  
Minimum Commercial General Liability Coverage  
\$1,000,000 each occurrence,  
\$3,000,000 general aggregate

Medium Project (\$2,000,001 to \$10,000,000)  
Minimum Commercial General Liability Coverage  
\$5,000,000 each occurrence,  
\$10,000,000 general aggregate

Large Project (Greater than \$10,000,000)  
Minimum Commercial General Liability Coverage  
\$10,000,000 each occurrence,  
\$20,000,000 general aggregate

For insurance purposes, the size of the Project will be specified in the Contractor's Agreement. Such excess or umbrella liability policy will follow form with the primary liability policies, and contain a drop-down provision in case of impairment of underlying limits.

- 10.1.3 Workers' Compensation Insurance and Employers' Liability Insurance. Worker's Compensation Insurance will cover full liability under the Worker's Compensation Laws of the jurisdiction in which the Project is located at the statutory limits required by this jurisdiction's laws. Contractor will also maintain Employer's Liability Insurance with limits of at least \$1,000,000 each accident, \$1,000,000 for bodily injury by accident, and \$1,000,000 each employee for injury by disease. Contractor will collect and keep on-file evidence that Contractor and all tiers of Subcontractors have current certificates of this Workers Compensation Insurance (as required by State statute) as well as Employer's Liability Insurance, and will produce them upon request by Intermountain.
- 10.1.4 Automobile. Automobile liability insurance for claims arising from the ownership, maintenance, or use of a motor vehicle. The insurance will be written on an "occurrence" form and will apply to "any auto" and will cover all owned, non-owned, and hired automobiles used in connection with the work, with the following minimum limits of liability: \$1,000,000 – Combined Single Limit Bodily Injury and Property Damage per Occurrence.
- 10.1.5 Pollution Liability Insurance. Pollution Liability Insurance covering Contractor's or appropriate Subcontractor's liability for bodily injury, property damage and environmental damage resulting from sudden, accidental, and gradual pollution and related cleanup costs incurred by Contractor, all arising out of the goods delivered or Work and services performed (including transportation risk) under this Contract, is required with limits of at least \$1,000,000 per claim and \$1,000,000 annual aggregate.
- 10.1.6 Aircraft Use. Contractor using its own manned or unmanned aircraft, or employing manned or unmanned aircraft in connection with the work performed under the Contract Documents will maintain Aircraft Liability Insurance with a combined single limit of not less than \$1,000,000 per occurrence. This certificate will state that the policy required by this paragraph has been endorsed to name Intermountain as an Additional Insured.
- 10.1.7 Policy Aggregate(s). Unless project specific insurance is required by Intermountain, the above insurance coverages will be written or endorsed under a policy to have general, per occurrence, and aggregate limits of liability applicable to this project only.
- 10.1.8 Certificates. Before the Contract Documents are executed, Contractor will submit certificates in form and substance satisfactory to Intermountain as evidence of the insurance requirements of this Article 10. Contractor will obtain copies of Additional Insured (Ongoing and Completed Operations), Waiver of Subrogation, and Primary and Non-Contributory Endorsements and/or policy clauses. The certificates will contain provisions that no cancellation, or non-renewal will become effective except upon thirty (30) Days prior written notice by US Mail to Intermountain as evidenced by return receipt, certified mail sent to Intermountain. Contractor will notify Intermountain within thirty (30) Days of

any claim(s) against Contractor which singly or in the aggregate exceed 20% of the applicable required insured limits and Contractor will, if requested by Intermountain, use its best efforts to reinstate the policy within the original limits and at a reasonable cost. Intermountain will be named as an additional insured party, as primary coverage and not contributing, on all the insurance policies required by this Article, except the professional liability and workers' compensation policies, by endorsements satisfactory to Intermountain -- using a combination of ISO forms CG 20 10 (07/04), Additional Insured – Owners, Lessees or Contractors – Scheduled Person or Organization and CG 20 37 (07.04) Additional Insured – Owners, Lessees or Contractors – Completed Operations, or other forms acceptable to Intermountain, naming Intermountain and A/E as additional insureds. Intermountain reserves the right to request Contractor to provide a loss report from its insurance carrier. Contractor will collect and keep on-file evidence that Contractor and each Subcontractor has current certificates of Commercial General Liability Insurance, Excess /Umbrella Liability Insurance, and other insurance required herein, and will produce them upon request by Intermountain.

- 10.1.9 Maintain throughout Contract Documents Term. Contractor will maintain, from commencement of the Work, insurance coverage required in Articles 10.1 and 10.2 as follows:
- a. Commercial General Liability Insurance through expiration of the statute of limitations/repose for completed operations, but in no event less than ten (10) years from completion of the Project; and
  - b. All other insurance through final payment.
- 10.1.10 Waivers of Subrogation. Contractor waives all rights against Intermountain and other additional insureds for recovery of damages to the extent the losses and damages are covered by existing insurance, including without limitation commercial general liability, commercial excess/umbrella liability, business auto liability, workers compensation or employer's liability insurance, and pollution liability insurance. Contractor will ensure that all insurance policies required herein will be endorsed to include waivers of subrogation in favor of Intermountain. Contractor hereby waives all rights of subrogation against Intermountain.
- 10.1.11 Excess Coverages. Any type of insurance or any increase of limits of liability not described in the Contract Documents which Contractor requires for its own protection or on account of any statute, rule or regulation, will be its own responsibility and at its own expense.
- 10.1.12 Not Relieve Contractor of Liability. The carrying of any insurance required by the Contract Documents will in no way be interpreted as relieving Contractor of any other responsibility or liability under the Contract Documents or any applicable law, statute, rule, regulation, or order.
- 10.1.13 Contractor Compliance with Policies. Contractor will not violate or permit to be violated any of the provisions of the insurance policies required under the Contract.
- 10.1.14 Deductible Liability. Any and all deductibles in the above described policies will be assumed by, for the account of, and at the sole risk of Contractor. The allowable deductible for any of the Contractor insurance policies required by these General Conditions shall be no less than \$1,000 or 0.1 percent of the Contract Amount, whichever is greater.

## **10.2 "Builder's Risk" Property Insurance.**

- 10.2.1 In General. Intermountain will provide through Substantial Completion "Builder's Risk" property insurance for the cost of the Project. The policy will be written on an all risk basis, with exclusions standard for the insurance industry, on policy forms currently and commercially available, with insurance carriers selected by Intermountain.
- 10.2.2 Deductible. The above described "Builder's Risk" policies shall be subject to a total deductible of \$5,000 per loss occurrence, which deductible shall be assumed by Contractor or Subcontractors, in proportion to their share of the total amount of an insured loss occurrence.

- 10.2.3 Waiver. To the extent damages are covered by the above described “Builder’s Risk” policies, Contractor, including all Subcontractors and Material Suppliers, and Intermountain hereby waive all rights against each other for damages caused by perils insured against under the “Builder’s Risk” insurance provided. Contractor will require similar waivers from each of their contractors, subcontractors, material suppliers, sub-consultants and agents, at any tier.
- 10.2.4 Policy Terms. Intermountain will provide a copy of the terms and conditions of the builders risk policy to Contractor upon Contractor’s request. Contractor will comply with terms, conditions, and deadlines of the builders risk policy. The terms, conditions, and deadlines of the builders risk policy shall govern coverage. Contractor will cooperate with Intermountain and the builders risk commercial insurer in the investigation, documentation, and settlement of loss claims, including without limitation promptly responding to all requests for information and documentation from the builders risk commercial insurer and/or Intermountain.
- 10.2.5 Special Hazards. Intermountain will bear the risk of loss, delay and/or damage due to earthquake and/or flood and may either insure or self-insure that risk.

**10.3 Performance Bond and Payment Bond.** If required by the Contract Documents, Contractor will before commencement of the Work or within ten (10) Days after signing the Agreement, whichever is earlier, submit and maintain in full force and effect as required by law and the Contract Documents, as part of the Construction Costs for the Project, written on Form AIA Document A312 (1984) or on other forms provided by Intermountain, and include as part of the quoted total all costs involved in securing and furnishing, a performance bond and a labor and material payment bond the bonds listed below, based on the completed cost of the Contract and effective upon execution of the Contract. These bonds will be from a surety company or companies licensed in the state in which the Project is located and holding valid certificates of authority under Sections 9304 to 9308, Title 31, of the United States Code as acceptable sureties or reinsurance companies on federal bonds, have a penal sum obligation not exceeding the authorization shown in the current revision of Circular #570 as issued by the United States Treasury Department, i.e. “Treasury List”, and be accompanied by a certified copy of the power of attorney stating the authority of the attorney-in-fact executing the bonds on behalf of the surety.

- a. A full 100 percent performance bond covering the faithful execution of the Contract in accordance with the Contract Documents; and
- b. A full 100 percent payment bond covering payment of all obligations arising under the Contract Documents, for the protection of each person supplying labor, service, equipment, or material for the performance of the Work.

All Subcontractor performance and payment bonds will name Contractor and Intermountain as Obligee. Intermountain reserves the right to reject any surety company, performance bond, or labor and material payment bond with or without cause.

**10.4 Intermountain Self-Insurance.** Intermountain may, at its option, satisfy any insurance requirements applicable to Intermountain through its self-insurance and risk management program.

## **11. MISCELLANEOUS PROVISIONS.**

**11.1 A/E’s Responsibilities.** These General Conditions are not intended to provide an exhaustive or complete list of A/E’s responsibilities. A separate agreement between Intermountain and A/E incorporates these General Conditions by reference and includes additional design responsibilities.

**11.2 Successors and Assigns.** Intermountain and Contractor respectively bind themselves, to the other party in respect to covenants, agreements and obligations contained in the Contract Documents. Contractor will not assign the Contract, or any of its rights or obligations under the Contract, without the prior written consent of Intermountain, nor will Contractor assign any amount due or to become due as well as any rights under the Contract, without prior written consent of Intermountain. Intermountain may assign the

Contract to an institutional lender providing financing for the Project. In such event, the lender will assume Intermountain's rights and obligations under the Contract. Contractor will execute all consents reasonably required to facilitate such assignment.

**11.3 Written Notice.** Written notice will be deemed to have been duly served if (a) delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended, or (b) delivered at or sent by registered or certified mail, return receipt requested, or (c) deposited for delivery with a nationally recognized overnight courier service, to the last business address known to the party giving notice.

**11.4 Rights and Remedies.**

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

11.4.2 Not Waiver. Except as expressly provided elsewhere in the Contract Documents, no action or failure to act by Intermountain, A/E or Contractor will constitute a waiver of a right or duty afforded them under the Contract Documents, nor will such action or failure to act constitute approval or acquiescence in a breach thereunder, except as any of the above may be specifically agreed to in writing. In no case will Contractor or any Subcontractors be entitled to rely upon any waiver of any of these General Conditions unless agreed to in writing by Intermountain.

**11.5 Use of Intermountain Forms.** Unless otherwise specifically identified in the Contract, all references or requirements for use or submission of documents to Intermountain, to A/E, or to others must be on Intermountain's approved forms. These forms include, without limitation, pay application, requests for payment, proposed change orders, change orders, modifications, requests for information, continuation sheets, waiver and lien releases, verifications, and other project related documents. Notwithstanding, Intermountain may in its sole discretion accept alternate forms. However, Intermountain's acceptance of an alternate form in one instance does not waive or modify the requirements herein for subsequent submissions.

**11.6 Governing Law, Jurisdiction and Venue.** To the maximum extent permitted by law, Utah laws, excluding its conflict-of-law provisions, govern the Contract and both Intermountain and Contractor submit to the exclusive jurisdiction and venue of state and federal courts located in Salt Lake County, Utah.

**11.7 Interpretation.** In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an", but the fact that a modification or an article is absent from the statement and appears in another is not intended to affect the interpretation of either statement.

**11.8 Severability.** The invalidity of any part, paragraph, subparagraph, phrase, provision or aspect of the Contract documents will not impair or affect in any manner the validity, enforceability or effect of the remainder of the Contract Documents.

**11.9 Construction of Words.** Unless otherwise stated in the Contract Documents, words, which have well-known technical or construction industry meanings, will be construed as having such recognized meanings. Unless the context requires otherwise, all other technical words will be construed in accordance with the meaning normally established by the particular, applicable profession or industry. All other words, unless the context requires otherwise, will be construed with an ordinary, plain meaning.

**11.10 No Third-Party Rights.** The Contract Documents will not be construed to create a contractual relationship of any kind (1) between A/E and Contractor, (2) between Intermountain and a Subcontractor or (3) between any persons or entities other than Intermountain and Contractor. Nothing contained herein will be deemed as creating third party beneficiary contract rights or other actionable rights or duties as



between Contractor and A/E, or as between Intermountain, Contractor, or A/E on the one hand, and any other person or entity.

- 11.11 Change of Control.** If a third party acquires a controlling interest (i.e., 50% ownership or more) of Contractor, then (a) Contractor will notify Intermountain within fifteen (15) Days of that acquisition, and (b) upon that acquisition, Intermountain may terminate for cause the Contract immediately upon written notice to Contractor.
- 11.12 Entire Agreement and Amendment Limitation.** The Contract represents the entire and integrated agreement between Intermountain and Contractor and supersedes all prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by (1) a written amendment executed by both Intermountain and Contractor, or (2) by a Modification.
- 11.13 Notices.** Any notice required by the Contract will be served upon the recipient's designated representative by hand delivery at the last known business address, or by mail or nationally recognized overnight courier service with "delivery confirmation" to the last known address.
- 11.14 No Publicity.** Without receiving prior written approval from an Intermountain vice president, Contractor will not distribute any publicity regarding the Contract.
- 11.15 Waivers.** No waiver by Intermountain or Contractor of any default will constitute a waiver of the same default at a later time or of a different default.
- 11.16 Waiver of Consequential Damages.** Intermountain and Contractor waive all claims against each other for any consequential damages that may arise out of or relate to the Contract. Intermountain waives damages including but not limited to is loss of use of the Project, any rental expenses incurred, loss of income, profit, or financing related to the Project, loss of business, the services of employees, or loss of reputation. Contractor waives damages including but not limited to the loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to this Project, loss of bonding capacity or loss of reputation. This section may not be construed to preclude recovery of consequential damages when such damages are actually recovered from insurance policies required by the Contract Documents. The provisions of this section also apply to the termination of the Contract and survive such termination.
- 11.17 Compliance.**
- 11.17.1 Remuneration. Remuneration flowing between the parties is at fair market value for actual and necessary items furnished or services rendered, is based upon an arm's-length transaction, and does not take into account, directly or indirectly, the value or volume of any past or future referral or other business generated between the parties (or of any referral or business of any principal, affiliate, or immediate family member - as those terms may be defined by applicable laws - of either party).
- 11.17.2 Financial Relationships. To its knowledge, Contractor (a) is not a physician-owned entity and (b) has no prohibited financial relationship with any physician who is in a position to generate business for Intermountain, or with an immediate family member of that physician. Intermountain defines a "physician-owned entity" as any entity in which a physician, or immediate family member of a physician, holds an ownership, investment, or royalty interest (if royalties are paid on any purchase resulting from the royalty holder's order). The Code of Federal Regulations (CFR) defines "financial relationship" (in 42 CFR 411.354) and "immediate family member" (in 42 CFR 411.351).
- [Note: Physicians and their immediate family members may own investment securities of Contractor if that investment complies with 42 CFR 411.356(a) or (b), and may have a compensation arrangement that both complies with 42 CFR 411.357(p) and does not take into account the volume or value of referrals or other business generated for Intermountain by a physician or a physician's immediate family members.]

- 11.17.3 Exclusion or Sanction. Contractor warrants that neither it, or any of its affiliates or employees, excluded from participation in, or sanctioned under, any state or federal healthcare program, including those set forth in 42 U.S.C. §1320a 7b(f). Contractor will notify Intermountain immediately in writing if the warranty in the preceding sentence is, or becomes, inaccurate during the Term.
- 11.17.4 Access to Books and Records. Intermountain is a provider under Federal Medicare programs and is subject to Section 952 of the Omnibus Reconciliation Act of 1980. That law requires Intermountain, as a provider, to include the following provision in its agreements with suppliers who receive \$10,000 or more under an agreement with Intermountain. If requested by the Secretary of HHS, by the U.S. Comptroller, or by an authorized representative of either of them, Contractor will make available to the requestor the Contract and Contractor's books, documents, and records to allow the requestor to certify the nature and extent of the charges for services provided under the Contract and charged to Medicare. Contractor will continue to make those items available for four years after Contractor furnishes the final products (or services) under the Contract. If Contractor contracts with another to carry out any of Contractor's duties under the Contract and the Subcontractor is to receive \$10,000 or more in value under that subcontract, then Contractor will obtain a written contractual commitment from the Subcontractor to comply with the obligations of this section of the Agreement. The obligations of this Section survive the expiration or other termination of the Contract.
- 11.17.5 Code of Ethics. In its dealings with Intermountain, Contractor has and will comply with all codes of ethics applicable to suppliers and their interactions with purchasers like Intermountain, including, without limitation, the AdvaMed Code of Ethics on Interactions with Health Care Professionals.
- 11.17.6 Facility Access Policy. All of Contractor's representative(s) entering any Intermountain facility must comply with Intermountain's Facility Access Policy. This policy requires each of these Contractor representatives to check in with Intermountain on each visit to an Intermountain facility to receive an identification badge; and as applicable, log onto: <https://intermountainhealthcare.org/supply-chain-organization/for-suppliers/for-current-suppliers/access-to-intermountain-facilities/> and complete the registration requirements. Please contact Intermountain representative with any questions.
- 11.17.7 Equal Opportunity. Affirmative Action. Intermountain is an equal opportunity employer and federal contractor. Consequently, the parties agree that, to the extent applicable, they will comply with the following, which are incorporated herein by reference: 41 CFR 60 1.4(a), 41 CFR 60 300.5(a), 41 CFR 60 741.5(a), and Executive Order 13496 (29 CFR Part 471, Appendix A to Subpart A), relating to the notice of employee rights under federal labor laws, specifically:
- a. Intermountain and Contractor will abide by the requirements of 41 CFR 60 300.5(a), as applicable. This regulation prohibits discrimination against qualified protected veterans, and requires affirmative action by covered prime contractors and Subcontractors to employ and advance in employment qualified protected veterans.
  - b. Intermountain and Contractor will abide by the requirements of 41 CFR 60 741.5(a), as applicable. This regulation prohibits discrimination against qualified individuals on the basis of disability, and requires affirmative action by covered prime contractors and Subcontractors to employ and advance in employment qualified individuals with disabilities.
- 11.17.8 Remedies. If Contractor breaches any obligation of this section, Intermountain may immediately terminate for cause the Contract upon written notice to Contractor.
- 11.18 Work Restrictions / Drug Testing**. Contractor will ensure that Contractor, its agents, employees, and all Subcontractors do not use or consume alcohol or cannabis, or illegally use drugs, upon Intermountain's property or enter upon or perform any work on Intermountain's property while under their influence. Contractor will obtain necessary consents and will conduct periodic inspections and drug testing to monitor and ensure compliance with these requirements. Contractor will bear the expenses of such inspections and drug testing and will hold Intermountain harmless from all claims arising out of or relative thereto. In addition, Contractor will ensure that Contractor and all Subcontractors do not smoke or vape

anything upon Intermountain's property except and only within designated smoking areas approved by Intermountain.

**11.19 Utah State Sales Tax.** Contractors should be exempt on purchases of material installed or converted into real property to be used by Intermountain. The Contractor will furnish each vendor with Intermountain's Tax exemption number.

**11.20 Notice of Intent to Obtain Final Completion.** Contractor shall file with the Utah State Construction Registry, on its own behalf and/or on behalf of Intermountain, a notice of intent to obtain final completion at least forty-five (45) Days before the day on which Intermountain or Contractor files or could file a notice of completion under Utah statutes if: (1) the completion of performance time under the original contract for construction work is greater than one hundred twenty (120) Days; (2) the total original construction contract price exceeds \$500,000; and (3) neither Contractor nor Intermountain has obtained a payment bond in accordance with Utah Code Ann. Section 14-2-1.

**11.21 Notice of Completion.** Within five (5) Days of final completion of the Project and in compliance with Section 38-1a-507 Utah Code Annotated, Contractor shall file with the Utah State Construction Registry, and copy to Intermountain, a notice of completion which shall include, without limitation, the following:

- a. The name, address, telephone number, and email address of the person filing the notice of completion;
- b. The name of the county in which the Project and/or Project site is located;
- c. The date on which final completion is alleged to have occurred;
- d. The method used to determine final completion; and
- e. One of the following:
  1. The tax parcel identification number of each parcel included in the Project and/or Project site;
  2. The entry number of a preliminary notice on the same project that includes the tax parcel identification number of each parcel included in the Project and/or Project site; or
  3. The entry number of the building permit issued for the Project.

Notwithstanding any other provision of the Contract Documents to the contrary, Contractor and Intermountain agree that any breach or failure to comply with this requirement by Contractor will constitute a breach of contract and the Contractor will be liable for any direct, indirect, or consequential damages to Intermountain flowing from this breach.

**11.22 Audit Rights.** Contractor will keep, maintain and preserve complete, current and accurate books, records, and accounts of the transactions contemplated by this Agreement and such additional books, records and accounts as are necessary to establish and verify Contractor's compliance with the Contract. All these books, records and accounts will be available for inspection and audit by Intermountain and/or an independent third party designated by Intermountain and approved by Contractor at any time during the Term and for two (2) years thereafter, but only during reasonable business hours and upon reasonable notice. In addition:

- a. Intermountain agrees that its routine audits will not be conducted more frequently than once in any consecutive twelve (12) month period.
- b. If, after any audit of Contractor, Intermountain requires additional information regarding the transactions contemplated by the Contract, Contractor will furnish to Intermountain or to the third-party audit firm any additional information Intermountain specifies that relates to the audit period to establish and verify Contractor's compliance with the Contract Documents.

- c. Intermountain's right to inspect and audit is without prejudice to any other or additional rights or remedies of either party.
- d. Contractor agrees to not unreasonably withhold approval of any independent third-party audit firm.
- e. If an audit reveals an overcharge incurred by Intermountain on this Project, Contractor will provide a written response explanation, correct any error and remit any monies due within ten (10) Days after receiving notice of the error or overcharge.

Intermountain may audit applications for payments or any other aspect of the Services and Work of Contractor and of the Subcontractor or suppliers at any tier. Contractor will cooperate with Intermountain in providing all necessary information for any Intermountain audit.

## **12. TERMINATION OR SUSPENSION OF THE CONTRACT.**

### **12.1 Termination by Contractor.**

12.1.1 In General. If the Work is stopped for a period of ninety (90) Days through no act or fault of Contractor or a Subcontractor, or their agents or employees or any other persons performing portions of the Work under contract with any of the above, Contractor, may terminate the Contract in accordance with 12.1.2 herein below for any of the following reasons:

- a. Because Intermountain has persistently failed to fulfill fundamental Intermountain's obligations under the Contract Documents with respect to matters important to the progress of the Work;
- b. Issuance of an order of a court or other public authority having jurisdiction which necessitates such termination, except that where Contractor has standing, Contractor must cooperate in efforts to stay and/or appeal such order;
- c. A governmental declaration of national emergency, making material unavailable; or
- d. Unavoidable casualties or other similar causes as listed in Paragraph 12.2.2(2) herein below.

12.1.2 Notice. If one of the reasons for termination in Paragraph 12.1.1 hereinabove exist, Contractor may, upon ten (10) additional Days' written notice to Intermountain and A/E, and such condition giving cause for termination still not cured, terminate the Contract and recover from Intermountain payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages associated only with work completed before the notice of termination.

### **12.2 Termination by Intermountain for Cause.**

12.2.1 In General. Intermountain may terminate the Contract if Contractor fails to cure any of the following within a period of ten (10) Days (or longer if Intermountain so approves in writing) after receipt of notice from Intermountain specifying the cause for termination:

- a. Contractor refuses or fails to supply enough properly skilled workers or proper materials;
- b. Contractor fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between Contractor and the Subcontractors;
- c. Contractor disregards laws, ordinances, or rules, regulations, resolutions or orders of a public authority having jurisdiction; or
- d. Contractor fails to perform the Work within the time specified in the Contract Documents or any authorized extension thereof or Contractor fails to make progress with the Work as to endanger such compliance;
- e. Contractor fails to perform the Work or is otherwise in breach of a provision of the Contract Documents;

- f. Contractor fails to respond promptly to the financial responsibility inquiry herein;
  - g. As permissible by law for a reason to terminate, Contractor is adjudged bankrupt;
  - h. As permissible by law for a reason to terminate, Contractor should make a general assignment for the benefit to creditors;
  - i. As permissible by law for a reason to terminate, Contractor has or should have a receiver appointed on account of Contractor's insolvency; or
  - j. Contractor fails to follow the material safety requirements and precautions either as expressly provided in the Contract Documents or as consistent with the customary practices in the industry.
- 12.2.2 Intermountain's Right to Carry Out the Work. If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten (10) Day period (or longer if approved by Intermountain in writing) after receipt of written notice from Intermountain to cure such default or neglect, Intermountain may without prejudice to other remedies Intermountain may have, correct such deficiencies, including taking over the Work and prosecuting the same to completion, by contract or otherwise, and may take possession of, and utilize in completing the Work, such materials, appliances, and facilities as may be on the site of the Work as well as the site as necessary for its proper completion. In such case, Intermountain will offset from payments then or thereafter due Contractor the cost of correcting such deficiencies, including compensation for A/E, Intermountain's staff and legal counsel's additional services and expenses made necessary by such default, neglect or failure. If payments then or thereafter due Contractor are not sufficient to cover such amounts, Contractor will pay the difference to Intermountain. Contractor will continue performance of the Contract to the extent not terminated.
- 12.2.3 Items Required to Be Transferred or Delivered. Intermountain may require Contractor to transfer title and deliver to Intermountain, in the manner and to the extent directed by Intermountain:
- a. Any completed portion of the Work; and
  - b. Any partially completed portion of the Work and any parts, tools, dies, jigs, fixtures, drawings, information, and contract rights (hereinafter called "construction materials") as Contractor has specifically produced or specifically acquired for the performance of such part of this Contract as has been terminated; and Contractor will, upon direction of Intermountain, protect and preserve property in the possession of Contractor in which Intermountain has an interest.
- 12.2.4 Payment. When Intermountain terminates the Contract for one or more of the reasons stated in Paragraph 12.2.1, Intermountain may withhold payment and/or pursue all available remedies.
- 12.2.5 Intermountain Protection If Lienable. When the subject property is lienable, Intermountain may withhold from amounts otherwise due Contractor for such completed Work or construction materials such sum as Intermountain determines to be necessary to protect Intermountain against loss because of outstanding liens or claims for former lien holders.
- 12.2.6 Credits and Deficits. If the unpaid balance of the Contract Sum exceeds the full cost of finishing the Work, including compensation for A/E's services and expenses made necessary thereby, such excess will be paid to Contractor. If such cost exceeds the unpaid balance, Contractor will pay the difference to Intermountain this obligation for payment will survive the termination of the Contract.
- 12.2.7 If Contractor Found Not in Default or Excusable. If, after notice of termination of the Contract under the provisions of this Article, it is determined for any reason that Contractor was not in default under the provisions of this Article, or that the default was excusable under the provisions of this Article, the rights and obligations of the parties will be the same as if the notice of termination had been issued pursuant to the termination for convenience provisions.

- 12.2.8 Rights and Remedies Not Exclusive. The rights and remedies of Intermountain provided in this Article 12.2 will not be exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

### **12.3 Suspension, Delay or Interruption of Work by Intermountain for Convenience.**

- 12.3.1 By Intermountain in Writing. Intermountain may in writing and without cause, order Contractor to suspend, delay or interrupt the Work in whole or in part for such period of time as Intermountain may determine to be appropriate for the convenience of Intermountain.
- 12.3.2 Adjustments. Any adjustment in Contract Sum and Contract Time will be in accordance with Articles 3, 4, and 7.

### **12.4 Termination for Convenience of Intermountain.**

- 12.4.1 In General. The performance of Work under this Contract may be terminated by Intermountain in accordance with this Article 12.4 in whole, or from time to time, in part, whenever Intermountain will determine that such termination is in the best interest of Intermountain or any person for whom Intermountain is acting under this Contract. Any such termination will be effected by delivery to Contractor of a notice of termination specifying the extent to which performance of Work under the Contract is terminated, and the date upon which such termination becomes effective.
- 12.4.2 Contractor Obligations. After receipt of a notice of termination, and except as otherwise directed by Intermountain in writing, Contractor will:
- a. Stop work under the Contract on the date and to the extent specified in the notice of termination;
  - b. Place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the Work under the Contract as is not terminated;
  - c. Terminate all orders and subcontracts to the extent that they relate to performance of Work terminated by the notice of termination;
  - d. Assign to Intermountain in the manner, at the times, and to the extent directed by Intermountain, all of the right, title and interest of Contractor under the orders and subcontracts so terminated, in which case Intermountain will have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;
  - e. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of Intermountain, which approval or ratification will be final for all the purposes of this Article 12.4;
  - f. Transfer title and deliver to Intermountain in the manner, at the times, and to the extent, if any, directed by Intermountain:
    - (i) The fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced as a part of, or acquired in connection with the performance of the Work terminated by the notice of termination; and
    - (ii) The completed or partially completed drawings, information, and other property which, if the Contract had been completed, would have been required to be furnished to Intermountain;
  - g. Use best efforts to sell, in the manner, at the times, to the extent, and at the price or prices directed or authorized by Intermountain, any property of the types referred to in Paragraph 12.4.2.f above; provided, however, that Contractor:
    - (i) Will not be required to extend credit to any purchaser; and

- (ii) May acquire any such property under the conditions prescribed by and at a price or prices approved by Intermountain; and provided further that the proceeds of any such transfer of or disposition will be applied in reduction of any payments to be made by Intermountain to Contractor under this Contract or will otherwise be credited to the Contract Sum or paid in such other manner as Intermountain may direct;
  - h. Complete performance of such part of the Work as will not have been terminated by the notice of termination; and
  - i. Take such action as may be necessary, or as Intermountain may direct, for the protection and preservation of the property related to this Contract which is in the possession of Contractor in which Intermountain has or may acquire an interest.
- 12.4.3 Agreed Upon Payment. Subject to the provisions of Paragraph 12.4.2 above, Contractor and Intermountain may agree upon the amount to be paid to Contractor by reason of the total or partial termination of Work pursuant to this Article 12.4.
- 12.4.4 Payment Not Agreed Upon. In the event of the failure of Contractor and Intermountain to agree, as provided in Paragraph 12.4.3, upon the whole amount to be paid to Contractor by reason of the termination of Work pursuant to this Article 12.4, Intermountain will pay to Contractor the portion of the Contract Sum requisite with the portion of the Work completed as determined by Intermountain as of the date of termination, subject to offsets if any.
- 12.4.5 Deductions. In arriving at the amount due Contractor under this Article 12.4, there will be deducted:
- a. All unliquidated advance or other payments on account theretofore made to Contractor, applicable to the terminated portion of this Contract;
  - b. Any Claim which Intermountain may have against Contractor in connection with this Contract; and
  - c. The agreed price for, or the proceeds of sale of, any materials, supplies, or other things acquired by Contractor or sold, pursuant to the provisions of this Article 12.4, and not otherwise recovered by or credited to Intermountain.
- 12.4.6 Partial Payments. Intermountain may, from time to time, under such terms and conditions as it may prescribe, make partial payments and payments on account against cost incurred by Contractor in connection with the terminated portion of this Contract whenever, in the opinion of Intermountain the aggregate of such payments will be within the amount to which Contractor will be entitled hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this Article 12.4, such excess will be payable by Contractor to Intermountain upon demand, together with interest at a rate of five percent (5%) per annum for the period until the date such excess is repaid to Intermountain; provided, however, that no interest will be charged with respect to any such excess payment attributable to a reduction in Contractor's claim by reason of retention or other disposition of termination inventory until ten (10) Days after the date of such retention or disposition, or such later date as determined by Intermountain by reason of the circumstances.
- 12.4.7 Preserve and Make Available Records. Unless otherwise provided for in this Contract, or by applicable law, Contractor will, from the effective date of termination until the expiration of three years after final settlement under this Contract, preserve and make available to Intermountain at all reasonable times at the office of Contractor, but without direct charge to Intermountain, all books, records, documents and other evidence bearing on the costs and expenses of Contractor under this Contract and relating to the Work terminated hereunder, or, to the extent approved by Intermountain Representative, photographs, micrographs, or other authentic reproductions thereof.
- 12.4.8 Intermountain's Right to Stop the Work. If Contractor fails to correct Work or fails to carry out Work, as required by the Contract Documents or fails to comply with all required and customary safety

precautions; Intermountain, by written order signed personally or by an agent specifically so empowered by Intermountain in writing, may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of Intermountain to stop the Work will not give rise to a duty on the part of Intermountain to exercise this right for the benefit of Contractor or any other person or entity.

END OF DOCUMENT





# AIA<sup>®</sup> Document A701<sup>™</sup> – 2018

## ***Instructions to Bidders***

for the following Project:  
*(Name, location, and detailed description)*

**THE OWNER:**  
*(Name, legal status, address, and other information)*

**THE ARCHITECT:**  
*(Name, legal status, address, and other information)*

### **TABLE OF ARTICLES**

<b>1</b>	<b>DEFINITIONS</b>
<b>2</b>	<b>BIDDER'S REPRESENTATIONS</b>
<b>3</b>	<b>BIDDING DOCUMENTS</b>
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<b>5</b>	<b>CONSIDERATION OF BIDS</b>
<b>6</b>	<b>POST-BID INFORMATION</b>
<b>7</b>	<b>PERFORMANCE BOND AND PAYMENT BOND</b>
<b>8</b>	<b>ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS</b>

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612<sup>™</sup>-2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

## ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

## ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

## ARTICLE 3 BIDDING DOCUMENTS

### § 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)*

**§ 3.1.2** Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

**§ 3.1.3** Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

**§ 3.1.4** Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

**§ 3.1.5** The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

### **§ 3.2 Modification or Interpretation of Bidding Documents**

**§ 3.2.1** The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

**§ 3.2.2** Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.  
*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)*

**§ 3.2.3** Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

### **§ 3.3 Substitutions**

**§ 3.3.1** The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

#### **§ 3.3.2 Substitution Process**

**§ 3.3.2.1** Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

**§ 3.3.2.2** Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

**§ 3.3.2.3** If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

**§ 3.3.3** The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

**§ 3.3.4** If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

#### § 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)*

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

### ARTICLE 4 BIDDING PROCEDURES

#### § 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

#### § 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

*(Insert the form and amount of bid security.)*

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

### § 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

*(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)*

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

### § 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

*(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)*

## ARTICLE 5 CONSIDERATION OF BIDS

### § 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

## **§ 5.2 Rejection of Bids**

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

## **§ 5.3 Acceptance of Bid (Award)**

**§ 5.3.1** It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

**§ 5.3.2** Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

## **ARTICLE 6 POST-BID INFORMATION**

### **§ 6.1 Contractor's Qualification Statement**

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

### **§ 6.2 Owner's Financial Capability**

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

### **§ 6.3 Submittals**

**§ 6.3.1** After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

**§ 6.3.2** The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

**§ 6.3.3** Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

**§ 6.3.4** Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

## **ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND**

### **§ 7.1 Bond Requirements**

**§ 7.1.1** If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

*(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)*

## § 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

## ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*
  
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*
  
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*
  
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:  
*(Insert the date of the E203-2013.)*
  
- .5 Drawings

Number	Title	Date	
.6	Specifications		
Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages
--------	------	-------

.8 Other Exhibits:

*(Check all boxes that apply and include appropriate information identifying the exhibit where required.)*

AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:  
*(Insert the date of the E204-2017.)*

The Sustainability Plan:

Title	Date	Pages
-------	------	-------

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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.9 Other documents listed below:

*(List here any additional documents that are intended to form part of the Proposed Contract Documents.)*





# AIA® Document G704™ – 2017

## Certificate of Substantial Completion

<b>PROJECT:</b> <i>(name and address)</i>	<b>CONTRACT INFORMATION:</b> Contract For: Date:	<b>CERTIFICATE INFORMATION:</b> Certificate Number: 001 Date:
<b>OWNER:</b> <i>(name and address)</i>	<b>ARCHITECT:</b> <i>(name and address)</i>	<b>CONTRACTOR:</b> <i>(name and address)</i>

The Work identified below has been reviewed and found, to the Architect’s best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.  
*(Identify the Work, or portion thereof, that is substantially complete.)*

ARCHITECT <i>(Firm Name)</i>	SIGNATURE	PRINTED NAME AND TITLE	DATE OF SUBSTANTIAL COMPLETION
------------------------------	-----------	------------------------	--------------------------------

### WARRANTIES

The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:  
*(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)*

### WORK TO BE COMPLETED OR CORRECTED

A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:  
*(Identify the list of Work to be completed or corrected.)*

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: \$

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:  
*(Note: Owner’s and Contractor’s legal and insurance counsel should review insurance requirements and coverage.)*

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

<b>CONTRACTOR</b> <i>(Firm Name)</i>	<b>SIGNATURE</b>	<b>PRINTED NAME AND TITLE</b>	<b>DATE</b>
<b>OWNER</b> <i>(Firm Name)</i>	<b>SIGNATURE</b>	<b>PRINTED NAME AND TITLE</b>	<b>DATE</b>

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# AIA<sup>®</sup> Document G706A<sup>™</sup> – 1994

## Contractor's Affidavit of Release of Liens

PROJECT: <i>(Name and address)</i>	ARCHITECT'S PROJECT NUMBER:	OWNER: <input type="checkbox"/>
TO OWNER: <i>(Name and address)</i>	CONTRACT FOR:	ARCHITECT: <input type="checkbox"/>
	CONTRACT DATED:	CONTRACTOR: <input type="checkbox"/>
		SURETY: <input type="checkbox"/>
		OTHER: <input type="checkbox"/>

STATE OF:  
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

### EXCEPTIONS:

#### SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY:

\_\_\_\_\_  
*(Signature of authorized representative)*

\_\_\_\_\_  
*(Printed name and title)*

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:

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# AIA<sup>®</sup> Document G707<sup>™</sup> – 1994

## Consent Of Surety to Final Payment

PROJECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

OWNER:

CONTRACT FOR:

ARCHITECT:

TO OWNER: *(Name and address)*

CONTRACT DATED:

CONTRACTOR:

SURETY:

OTHER:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the  
*(Insert name and address of Surety)*

on bond of  
*(Insert name and address of Contractor)*

, SURETY,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall  
not relieve the Surety of any of its obligations to  
*(Insert name and address of Owner)*

, CONTRACTOR,

as set forth in said Surety's bond.

, OWNER,

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:  
*(Insert in writing the month followed by the numeric date and year.)*

\_\_\_\_\_  
*(Surety)*

\_\_\_\_\_  
*(Signature of authorized representative)*

\_\_\_\_\_  
*(Printed name and title)*

Attest:  
(Seal):

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## UTILITIES SHUTDOWN REQUEST (Utilities & Emergency Egress, Etc.)

<b>Project Name:</b>	Project Name Address Address	<b>Contractor:</b>	Contractor Contact Name Phone Number
<b>Owner:</b>	IHC Health Services, Inc.	<b>Contractor(s)/ Subcontractor(s) Performing Work:</b>	Contractor Contact Name Phone Number
<b>FD&amp;C PM:</b>	PM Name		
<b>Start of Impairment:</b>	Date Time	<b>End of Impairment:</b>	Date Time

### IMPAIRMENT REQUIREMENTS

The Utilities Shutdown Request **MUST** be approved by Facility Management 3 working days (min.) before work begins.

Facility Management **MUST** be notified when work is ready to begin and when work is complete.

Facility Management and Contractor(s) will reactivate system(s) at approved times and **MUST** be notified if impairments need to be extended.

### SECTION 1 – IMPAIRED INFORMATION TO BE COMPLETED BY CONTRACTOR

#### AREA(S) AFFECTED (Building, Floor, Area/Department, Users, Devices, etc.)

Text

#### TYPE OF SHUTDOWN (CHECK ALL THAT APPLY)

<input type="checkbox"/> <b>Electrical</b>	<input type="checkbox"/> Emergency Power* <input type="checkbox"/> Main Switch Gear* <input type="checkbox"/> Individual Panel	<input type="checkbox"/> Single Breaker <input type="checkbox"/> Fire Alarm System* <input type="checkbox"/> _____
<input type="checkbox"/> <b>Plumbing</b>	<input type="checkbox"/> Sewer Stock <input type="checkbox"/> Vent <input type="checkbox"/> Hot Water Domestic	<input type="checkbox"/> Cold Water Domestic <input type="checkbox"/> Steam Line <input type="checkbox"/> _____
<input type="checkbox"/> <b>Sprinkler</b>	<input type="checkbox"/> Riser* <input type="checkbox"/> Individual Heat <input type="checkbox"/> Horizontal Mains/Areas	<input type="checkbox"/> Valves* <input type="checkbox"/> _____
<input type="checkbox"/> <b>Medical Gas</b>	<input type="checkbox"/> Compressed Air <input type="checkbox"/> Oxygen <input type="checkbox"/> Nitrous Oxide	<input type="checkbox"/> Vacuum <input type="checkbox"/> Special Mix Gas <input type="checkbox"/> Zone Valve Boxes <input type="checkbox"/> _____

**Mechanical**
 Chilled Water  
 Steam  
 Glycol

 Hot Water  
 Compressor  
 Condenser

 VAV's  
 Electrical Disconnects  
 \_\_\_\_\_

\* Requires Fire Alarm &amp; Security Coordination

**FACILITY PERMITS**
 **\*\*Above Ceiling**
 **\*\*Hot Work**
 **\*\*Infection Control Risk Control (ICRA)**
 **\*\*Other** \_\_\_\_\_

\*\* Completed forms must be attached

**PERCENT OF IMPAIRMENT** (For partial impairment, attach a list showing the area, smoke head, fire suppression system etc. that will be impaired)

Text

**REASON FOR IMPAIRMENT**

Text

**COMMENTS**

Text

**ATTACHMENTS**

1. *3\_Pre-Construction GC Detailed Shutdown Plan\_Template.xlsx*
2. *Facility Site Area Floor Plan*

**SECTION 2 – TO BE COMPLETED BY FACILITY MANAGEMENT**

1. Will fire alarm be taken off line for any amount of time? Yes \_\_\_\_\_ No \_\_\_\_\_  
If Yes, Facility Management must review and sign. \_\_\_\_\_
2. Will this impairment extend more than 4 hours? Yes \_\_\_\_\_ No \_\_\_\_\_  
If Yes, a fire watch must be implemented, Intermountain Healthcare Safety Officer and Insurance Provider must be notified.
3. Department Managers of impaired areas notified:  
 Facility Management: \_\_\_\_\_ Date: \_\_\_\_\_  
 FD&C Project Manager: \_\_\_\_\_ Date: \_\_\_\_\_



# Above Ceiling Work Permit

\*\*Standards Referenced: NFPA 101 2012; NFPA 30 2012; NFPA 45 2011; NFPA 99 2012

Facility Name:   
Requestor Name:   
Company/Dept:   
Contact Phone:

Permit No.:   
Project No.:   
Work/PO No.:

Start Date:  Start Time:   
End Date:  End Time:

Exact Location of Work:

Description of Work:

Will ANY penetrations be made in walls, roof, floor or ceilings?  Yes  No

Will wiring or data cabling be installed or modified?  Yes  No

### Type of Wiring

Communication  
 Door Control  
 Low or High Voltage Electrical  
 Fiber Optic  
 Fire Alarm

HVAC  
 Security  
 Telephone  
 Television  
 Other -

Will fixtures, appliances, duct work or equipment be installed?  Yes  No

### How will the work be supported?

Fastened to deck or structure  
 Fastened to wall  
 Existing cable tray  
 Existing pipe rack or conduit rack

New cable tray  
 New pipe rack or conduit rack  
 Other -

Intermountain Point of Contact:  POC Phone:   
Print Name Clearly

### Site Pre-Inspection

Intermountain Representative:  Requestor:   
Print Name Clearly Print Name Clearly

Notes or Observations (if any):

### Site Post-Inspection

Intermountain Representative:  Requestor:   
Print Name Clearly Print Name Clearly

No unsealed penetrations observed  All installations properly supported

Notes or Observations (if any):

### Intermountain Review and Approval of Work

Intermountain Representative:  Date:   
Signature

### Why do we have to do this?

Because more people die of smoke inhalation in fires than die of fires in fires.  
Because 6% of all TJC findings at Intermountain are penetrations in smoke or fire barriers.

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# Hot Work Permit



Facility Name:

Requestor Name:

Company/Dept:

Contact Phone:

Permit No.:

Project No.:

Start Date:

End Date:

Work / PO No.:

Start Time:

End Time:

Exact Location of Work:

Description of Work:

### Heat Sources

- Gas Torch     Grinder     Arc Welder     Drill     Chemical  
 Other -

Will work require disabling fire detection or suppression systems?     Yes     No

Will systems be disabled longer than 4 hours in any 24 hours?     Yes     No

Will work generate smoke, odors or fumes?     Yes     No

### Establishing The Work Area

- |  |  |
|--|--|
| <input type="checkbox"/> 35' space clear of combustibles           | <input type="checkbox"/> Appropriate fire extinguishers on hand      |
| <input type="checkbox"/> Fire blankets or protective mats in place | <input type="checkbox"/> Confined space permit on hand or not needed |
| <input type="checkbox"/> Space is well-ventilated                  | <input type="checkbox"/> Atmosphere tested non-explosive             |
| <input type="checkbox"/> Signage and barricades in place           | <input type="checkbox"/> Welding shields are in place as needed      |
| <input type="checkbox"/> Safety observer on hand                   | <input type="checkbox"/> Fire watch arranged for                     |
| <input type="checkbox"/> Other precautions: <input type="text"/>   |  |

Intermountain Point of Contact:     POC Phone:

Emergency Phone Number:

### Upon Conclusion of Work

Name of Fire Watch Personnel:     Supervisor:

- Fire watch was kept for 60 minutes after hot work was complete  
 No sign of smoke or fire was detected during fire watch

Notes or Observations (if any):

### Intermountain Review and Approval of Work

Intermountain Point of Contact:     Date:

### Why do we have to do this?

- Because more people die of smoke inhalation in fires than die of fires in fires.
- Because 6% of all TJC findings at Intermountain are penetrations in smoke or fire barriers.

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PeopleSoft Project # or Job Name: LRH Imaging Registration Remodel

Infection Control Risk Assessment (ICRA)



Work Permit

20190416

Facility or Location: LRH

Project Start Date: April 2021

Contractor Project Manager: TBD

Estimated Completion Date: June 2021

Contractor Performing Work: TBD

Need to Relocate Patients? Yes No

Affected Department Supervisor Signature: Name: Date:

Environmental Service Supervisor Signature: Julie H. Rigby Name: Julie Rigby Date: 2-23-21

Intermnt Hlthcare Project Manager Signature: Milt White Name: Milt White Date: 02/17/2021

Construction Activity Class (Determine Class by using the Classification Table on pages 2 & 3): Higher levels must include all lower levels. Example: a level III must also check I and II. [X] Class I [X] Class II [X] Class III [X] Class IV

Specific Areas to be Affected by This Work: Imaging Registration, Imaging Waiting Area Initials: MW Date: 02/17/2021

Exceptions or Additions to This Permit: Initials: Date:

Signature of Permit Requested by: Milt White Name: Milt White Date: 02/17/2021

Infection Prevention Approval Signature: Kerry Elwood Name: Kerry Elwood Date: 2/23/2021

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# Intermountain Healthcare

## Facilities Management

### Interim Life Safety Measures Work Permit

**\*\* Standards Referenced: LS 01.02.01; NFPA 101 2000 Sections 9.6.1.8, 9.7.6.1**

PeopleSoft Project # or Job Name:

Project Start Date:

Project Manager:

Estimated Completion Date:

Contractor Performing Work:

Need to Relocate Patients?

Yes     No

Affected Department Supervisor Signature:

Date Signed:

Environmental Services Supervisor Signature:

Date Signed:

Environment of Care Manager Signature:

Date Signed:

**Affected Life Safety Systems**

Fire Detection     
  Fire Suppression     
  Fire or Smoke Barriers     
  Egress

**Specific Areas to be Affected by This Work:**

Initials:

Date:

**Exceptions or Additions to This Permit:**

Initials:

Date:

**Request and Approval:**

Permit Request By:

Printed Name:

Permit Approved By:

Printed Name:

Signature:

Signature:

Date:

Date:

**Fire Detection, Suppression and Barrier Systems**

Yes No

- Will individual smoke or heat detectors be out of service longer than 4 hours?
- Will fire alarm panel be out of service or in "test" mode longer than 4 hours?
- Will fire alarm circuits be out of service longer than 4 hours?
- Will fire alarm communication lines be out of service longer than 4 hours?

If "yes" to any of the above, detail the interim life safety measures to be taken below:

Yes No

- Will covers be placed on any smoke or heat detectors?

If "yes" list the devices to be covered and when the covers will be removed:

On conclusion of work, check box to indicate that all covers have been removed.

Yes No

- Will any component of the uppression system be out of service longer than 4 hours?

If "yes," detail the interim life safety measures to be taken below:

Yes No NA

- Will any floor, wall or ceiling be penetrated?
- If "yes" above, is the floor, wall or ceiling a rated assembly?

If "yes," detail the interim life safety measures to be taken below:

**Egress Integrity**

Yes No

- Will any portion of the work obstruct a means of egress?
- Will any portion of the work alter a means of egress?
- Will any portion of the work obstruct, impair or remove egress signage?
- Will any portion of the work obstruct, impair or remove egress lighting?

If "yes," detail the interim life safety measures to be taken below:



**Maintaining a Safe Work Environment**

Yes      No

- Will a Hot Work Permit be needed?
- Will a Confined Space Entry Permit be needed?
- Will an Above Ceiling Work Permit be needed?
- Will air quality monitoring be required on site?

Workplace Safety Guidelines

- Access to the work site is restricted to authorized personnel only.
- All personnel wear appropriate PPE while on site.
- All personnel have had a site safety briefing and know where emergency services are located.
- Tobacco use is strictly prohibited on the work site.
- Chemical safety data sheets and safety stations are available to all personnel on site.
- The work site is maintained in a clean and orderly state at all times.
- All tools are unplugged and power turned off at the end of each work day.
- All tools, including extension cords and ladders are in safe operating condition.
- Any temporary structures or partitions are built smoke tight and of non-combustible materials.
- Intermountain Healthcare is notified of any fire system shut down before work begins.

Workplace Safety Guidelines for Long-Duration Projects

- Fire alarm and temporary suppression systems will be tested monthly.
- At least 1 fire drill will be conducted per shift per month.

Describe the Project Communication Plan for traffic patterns, EVS, etc.:

Describe the Project Monitoring Plan for life safety measures:

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APPLICATION AND CERTIFICATION FOR PAYMENT

To Owner: IHC Health Services, Inc. Owner Project #: Owner Project #
36 South State Street Application #: 1
Salt Lake City, UT 84111 Application Date: 12/1/2018
From Contractor: Contractor Name Architect Name Address Address
City, State, Zip City, State, Zip
Via A/E:
Contract Invoice #: 1
Project Name: Project Name Contract Date: 12/17/2016

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. The Continuation Sheet is attached.

Table with 2 columns: Description and Amount. Rows include: 1. Original Contract Sum (\$100.00), 2. Total Contract Change By Change Orders (\$-), 3. Current Contract Sum (\$100.00), 4. Total Completed & Stored To Date (\$75.00, 75.00%), 5. Retention (5.1-5.6), 6. Total Earned Less Retainage (\$71.25), 7. Less Previous Certificates For Payments (\$-), 8. Current Payment Due (\$23.75, 23.75%), 9. Balance To Finish, Plus Retention (\$76.25, 76.25%).

CONTRACTOR'S CONTRACTOR NAME

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

By: John Doe Date: 12/31/2018

State of:
Subscribed and sworn to before me this \_\_\_ day of \_\_\_
Notary Public:
My Commission Expires: \_\_\_

A/E'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based upon on-site observations and the data comprising the application, the A/E certifies to the Owner that to the best of the A/E's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the Amount Certified.

Amount Certified: \$23.75

A/E: By: Date:

This Certificate is not negotiable. The amount certified is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

Approved by FD&C PM 1, 2: (Signature) (Date)

Change Order Summary table with 2 columns: Description and Amount. Rows include: Total Changes Approved in Previous Months By Owner (\$-), Total Approved Changes This Month (\$-), Total Contract Change By Change Orders (\$-).

1 For major capital projects, FD&C Project Manager to sign. 2 Intermountain's "Monthly Pay Application Checklist" must be submitted by PM with Contractor's Application & Certification for Payment before processing. 3 Contractor has verified the work associated with the "Current Payment Due" and has attached all relevant invoices and backup information with this application & certification for payment.



**CONTINUATION SHEET**  
**Application and Certification for Payment,**  
 Containing Contractor's signed certification is attached.

**Project Name:** Project Name  
**Owner Project #:** Owner Project #  
**Application #:** 1

**Application Date:** 12/1/2018  
**Period To:** 12/31/2018  
**Contractor Invoice #:** 1

A Item No.	B Description of Work	C Original Contract Sum (CM/GC Pre-Construction Fee; Contract Buyouts)	D Total Contract Change By Change Orders	E Current Contract Sum (C + D)	F Work Completed		G Materials Presently Stored This Period (Not in For G)	H Total Completed and Stored Through This Period (F + G + H)	I % (I / E)	J Balance To Finish (E - I)	K This Period Retention (G + H * 5%)	L Total Retention Withheld (I * 5%)	M This Period Retention Released	N Total Retention Released	O Current Payment Due <sup>3</sup> (G + H - L + N)	P
					From Previous Applications	This Period In Place										
00001	Enter Description of Work	\$ 100.00	\$ -	\$ 100.00	\$ 50.00	\$ 25.00	\$ -	\$ 75.00	75%	\$ 25.00	\$ 1.25	\$ 3.75	\$ -	\$ -	\$ -	23.75
00002		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00003		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00004		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00005		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00006		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00007		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00008		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00009		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00010		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00011		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00012		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00013		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00014		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00015		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00016		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00017		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00018		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00019		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00020		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00021		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00022		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00023		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00024		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00025		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00026		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00027		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00028		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
00029		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
<b>Intermountain Project Grand Totals</b>		\$ 100.00	\$ -	\$ 100.00	\$ 50.00	\$ 25.00	\$ -	\$ 75.00	75%	\$ 25.00	\$ 1.25	\$ 3.75	\$ -	\$ -	\$ -	23.75

## A/E SUPPLEMENTAL INSTRUCTIONS

**ASI # 001**

<b>Project Name:</b>	<b>Project Name</b> <b>Address</b> <b>Address</b>	<b>A/E:</b>	<b>Architect</b>
<b>Bid Package:</b>	<b>1.0X</b>	<b>Date:</b>	<b>Date Issued</b>
<b>Owner:</b>	<b>IHC Health Services, Inc.</b>	<b>ASI Page Count:</b>	<b>XX</b>
<b>Intermountain Project #:</b>	<b>Project ID #</b>	<b>ASI Prepared By:</b>	<b>Name</b>
<b>FD&amp;C PM:</b>	<b>PM Name</b>	<b>Contractor:</b>	<b>Contractor</b>
<b>ASI Description:</b>	<b>Description</b>		

**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) 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&C<sup>1</sup>:**

 \_\_\_\_\_  
 (Signature)

 \_\_\_\_\_  
 (Date)

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

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## CONSTRUCTION CHANGE DIRECTIVE

**CCD # 001**

<b>Project Name:</b>	Project Name Address Address	<b>A/E:</b>	Architect
<b>Bid Package:</b>	1.0X	<b>Date:</b>	Date Issued
<b>Owner:</b>	IHC Health Services, Inc.	<b>CCD Page Count:</b>	XX
<b>Intermountain Project #:</b>	Project ID #	<b>CCD Prepared By:</b>	Name
<b>FD&amp;C PM:</b>	PM Name	<b>Contractor:</b>	Contractor
<b>CCD Subject:</b>	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 PM<sup>1</sup>:**

\_\_\_\_\_

(Signature)

\_\_\_\_\_

(Date)

**Approved by FD&C Exec. Director<sup>2</sup>:**

\_\_\_\_\_

(Signature)

\_\_\_\_\_

(Date)

<sup>1</sup> For major capital projects, FD&C Project Manager to sign.

For local facility managed projects, local facility Project Manager to sign.

<sup>2</sup> 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**

<b>Project Name:</b>	<b>Project Name</b> <b>Address</b> <b>Address</b>	<b>Contractor:</b>	<b>Contractor</b>
<b>Bid Package:</b>	<b>1.0X</b>	<b>CO Date:</b>	<b>Date</b>
<b>Owner:</b>	<b>IHC Health Services, Inc.</b>	<b>CO Page Count:</b>	<b>XX</b>
<b>Intermountain Project #:</b>	<b>Project ID #</b>	<b>CO Prepared By:</b>	<b>Name</b>
<b>FD&amp;C PM:</b>	<b>PM Name</b>	<b>A/E:</b>	<b>Architect</b>

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

**CO Description:** **Description**

PCO #	Description	Reason for Change	Amount
xxx	Enter Description	Enter Reason for Change from PCO Form	\$
<b>Total This Change Order:</b>			<b>\$</b>

### CO Details:

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

---

**Contractor:**

Contractor Firm  
Contractor Rep. Name - Title

**Architect:**

Architect Firm  
Architect Rep. Name - Title

**Intermountain Healthcare:**

IHC Health Services, Inc.  
Clay Ashdown/Adam Jensen<sup>1</sup>

---

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

---

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

---

VP, Financial Strategy, Growth and Development/  
Executive Director, Design and Construction \_\_\_\_\_ Date \_\_\_\_\_

---

FD&C Director<sup>2</sup> \_\_\_\_\_ Date \_\_\_\_\_

---

FD&C Project Manager<sup>3</sup> \_\_\_\_\_ Date \_\_\_\_\_

---

<sup>1</sup> Executive Director, Design and Construction to sign when Change Order amount is \$100,000 or less, otherwise, VP, Financial Strategy, Growth and Development is required to sign per the "Contract Policy" and "Approval Authority Expenditures Policy".

<sup>2</sup> For major capital projects, Executive Director, Design & Construction to sign if Change Order is more than \$100,000. For local facility managed projects, System Construction Director to sign.

<sup>3</sup> For major capital projects, FD&C Project Manager to sign. For local facility managed projects, local Facility Project Manager to sign.

## PROPOSED CHANGE ORDER

## PCO # 001

<b>Project Name:</b>	<b>Project Name</b> <b>Address</b> <b>Address</b>	<b>Contractor:</b>	<b>Contractor</b>
<b>Bid Package:</b>	<b>1.0X</b>	<b>PCO Issue Date:</b>	<b>Date Issued</b>
<b>Owner:</b>	<b>IHC Health Services, Inc.</b>	<b>PCO Page Count:</b>	<b>XX</b>
<b>Intermountain Project #:</b>	<b>Project ID #</b>	<b>PCO Prepared By:</b>	<b>Name</b>
<b>FD&amp;C PM:</b>	<b>PM Name</b>	<b>A/E:</b>	<b>Architect</b>

\*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. FD&C PM to coordinate with Capital Finance on facility reimbursement once PCO is signed.

### PCO Details:

\*A/E is responsible for \$\_\_\_\_\_. Agreed to if PCO is signed.  
 \*\*Facility is responsible for \$\_\_\_\_\_. Agreed to if PCO is signed.

Item	Subcontractor	Description	Amount
-	-	Enter Description	\$
		PCO Subtotal	\$
		Contractors Fee (5%) per the contract	\$
		Total Cost of this PCO Request	\$

**Contractor:**

Contractor Firm  
Contractor Rep. Name - Title

**Architect:**

Architect Firm  
Architect Rep. Name - Title

**Intermountain Healthcare:**

IHC Health Services, Inc.  
Owners' Rep. – PM Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
FD&C Project Manager<sup>1</sup>

\_\_\_\_\_  
Date

\_\_\_\_\_  
FD&C Director<sup>2</sup>

\_\_\_\_\_  
Date

\_\_\_\_\_  
<sup>1</sup> For major capital projects, FD&C Project Manager to sign.\*  
For local facility managed projects, local facility Project Manager to sign.\*

<sup>2</sup> For major capital projects, Executive Director, Design & Construction to sign when the charge exceeds \$200,000 as outlined in the "Construction Change Order Procedure".  
For local facility managed projects, System Construction Director to sign when the charge exceeds \$25,000 as outlined in the "Approval Authority Capital Expenditures Policy".

**\* PM signatures are required for all PCO's prior to work commencing.**

## PROPOSAL REQUEST

**PR # 001**

<b>Project Name:</b>	<b>Project Name</b> <b>Address</b> <b>Address</b>	<b>A/E:</b>	<b>Architect</b>
<b>Bid Package:</b>	<b>1.0X</b>	<b>Date:</b>	<b>Date Issued</b>
<b>Owner:</b>	<b>IHC Health Services, Inc.</b>	<b>PR Page Count:</b>	<b>XX</b>
<b>Intermountain Project #:</b>	<b>Project ID #</b>	<b>PR Prepared By:</b>	<b>Name</b>
<b>FD&amp;C PM:</b>	<b>PM Name</b>	<b>Contractor:</b>	<b>Contractor</b>
<b>PR Description:</b>	<b>Description</b>		

**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.*

***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 PM<sup>1</sup>:** \_\_\_\_\_  
 (Signature) (Date)

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

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# REQUEST FOR INFORMATION

**RFI # 001**

<b>Project Name:</b>	<b>Project Name</b> <b>Address</b> <b>Address</b>	<b>Contractor:</b>	<b>Contractor</b>
<b>Bid Package:</b>	<b>1.0X</b>	<b>Date:</b>	<b>Date Issued</b>
<b>Owner:</b>	<b>IHC Health Services, Inc.</b>	<b>RFI Page Count:</b>	<b>XX</b>
<b>Intermountain Project #:</b>	<b>Project ID #</b>	<b>RFI Prepared By:</b>	<b>Name</b>
<b>FD&amp;C PM:</b>	<b>PM Name</b>	<b>Architect:</b>	<b>Architect</b>
<b>RFI Description:</b>	<b>Description</b>		
<b>Cross Reference:</b>	<b>ASI #, Drawing Info, etc.</b>	<b>RFI Response Date Requested:</b>	<b>Date</b>

**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.*

**Contractor Signature:** *Signature* **Date:** *Date*

**QUESTION:**

Text

**RESPONSE:**

Text

<b>A/E Response By:</b>	<b>Name</b>	<b>Date:</b>	<b>Date</b>
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<b>A/E PM Acknowledgement:</b>	<b>Name</b>	<b>Date:</b>	<b>Date</b>
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## FUNCTIONAL CHANGE REQUEST

**FCR # 001**

<b>Project Name:</b>	Project Name Address Address	<b>A/E:</b>	Architect
<b>Bid Package:</b>	1.0X	<b>Date:</b>	Date Issued
<b>Owner:</b>	IHC Health Services, Inc.	<b>PR Page Count:</b>	XX
<b>Intermountain Project #:</b>	Project ID #	<b>PR Prepared By:</b>	Name
<b>FD&amp;C PM:</b>	PM Name	<b>Contractor:</b>	Contractor
<b>Request Description:</b>	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.*

*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<sup>1</sup>:** \_\_\_\_\_  
 (Signature) (Date)

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

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## PERSONNEL OVERTIME APPROVAL FORM

**Project Name:**  **Project Name**  
 **Address**  
 **City, State, Zip**

**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:

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

**Owner:**  
 **IHC Health Services, Inc.**  
 **FD&C Project Manager**

---

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

---

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

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# Contractor Orientation

Intermountain Healthcare Facilities Management

*This orientation is to be read to all workers by the Facility Manager or designee, and a copy is to be given to each worker on the job site.*

## Safety on the Job Site

### Your Safety

Unsafe acts will not be tolerated on the job site. We want you to be as healthy and whole when you go home, as you were when you arrived.

Appropriate PPE will be worn at all times while working on the job site. Ladders and other equipment will be used properly.

Always use the proper lock-out/tag-out (LOTO) procedures and equipment to ensure that you and others are protected from hazardous energy while working. Be aware that energized systems in healthcare facilities can be complex, and your work may affect others in remote areas of the facility. Coordinate any LOTO activity with the Facility Manager and other affected trades.

### The Safety of Others

Nothing you do should put others in danger or harm them in any way. Be thoughtful and deliberate about safety.

## Your Behavior on the Job Site

### How You Should Act

You should come to work with a clean body in clean clothes. You should come to work sober. Attempting to work while under the influence of any drugs or alcohol – even if they are prescribed – can be dangerous to you and others, and is cause for immediate removal from the job site.

Be considerate of others. Remember that others may take offense at things you do, even when you mean no harm. Avoid doing or saying things that may bother or upset others.

No music, no smoking, no cursing, no shouting, no leering, no fighting, no racially or culturally insensitive comments, no suggestive or offensive comments, no propositions, and no soliciting are permitted while you are on the job site.

### Phones, Cameras, and Other Communication or Recording Devices

You should not carry on personal communication or phone conversations while on the job site.

You must NEVER photograph, or video or audio record ANYTHING or ANYONE on Intermountain Healthcare property. This will not be tolerated, and in some cases this may violate the law. If work needs to be photographed, have your supervisor or the facilities team on site take the pictures.

On this job site, the person who authorizes photography or recording is: \_\_\_\_\_.

## Where You Should Be on the Property

### Parking

Park only in the location identified by the Facility Manager in your orientation. Parking personal vehicles in any other location may result in their removal.

On this job site, the parking location is: \_\_\_\_\_.

### Smoking

Smoking is not allowed on any Intermountain property. If you need to smoke, vape, or use tobacco in other ways, you must leave the property and return when you're done.

Drugs are never allowed.

### Break Time

Take breaks only in areas identified by the Facility Manager in your orientation. During breaks do not engage in loud conversation or use offensive language.

On this job site, the break location is: \_\_\_\_\_.

### Meals

The Facility Manager will tell you in your orientation if you are permitted to use the facility cafeteria and dining room during your meal time. Take meals only in areas identified by the Facility Manager in your orientation.

Never take breaks in public areas meant for patients and their guests.

On this job site, the meal location is: \_\_\_\_\_.

On this job site, the break location is: \_\_\_\_\_.

## When You Should Be on the Property

When you are working, or on the property for work you should not arrive earlier than is necessary for you to assemble your tools and equipment for the day. Arriving very early and 'hanging around' is not permitted. Your supervisor will tell you what time you should arrive at work.

When you are done with the work day, and your tools and equipment are cleaned and put away, and your job site is clean, you should leave the property directly. Staying on the job site after work is not permitted.

Of course, if you are a patient, or are visiting one of our patients, you are always welcome in the public areas of the facility. Do not visit the job site unless you are here for work.

We ask you that while you are here you remember that you may be seen by others as representing your company or ours, and to please comport yourself accordingly.

## How a Healthcare Facility May Be Different from Other Jobs Sites

### People

The people who come to our hospitals and other facilities come because they feel sick, hurt, scared, or sad. They don't come to see us when everything is going fine. They want to feel safe and comfortable and confident that everything will be better soon.

Many of them are sensitive to noise, dust, fumes, odors, and vibrations. Please do everything you can to control these irritants.

The procedures we do in our facilities frequently require quiet and stillness. Please be sensitive to this and be ready to accommodate requests to stop work briefly or move to a different area of the facility to continue working.

### Building Systems

The structure of our hospitals and other facilities is intended to actively work to protect our staff, patients, and visitors in the event of an emergency. This means that you must be very careful about how your work impacts other systems and parts of the building. Some of the rules are strange, but all are important.

Certain walls are intended to stop smoke or fire from spreading because when our buildings catch fire we cannot leave. We continue to care for our patients, perform surgeries, help birth babies, and provide emergency medical care. When working around or through these walls – “rated assemblies” – it is critical that you do so properly.

A pre-inspection by a member of the facility's maintenance team of the area you'll be working in is required so that you can understand where rated assemblies are, and how you must treat them. This also gives you an opportunity to identify existing conditions for which you may not be responsible.

A post-inspection by a member of the facility's maintenance team of the work you've done is required so that you can demonstrate that you've complied with all requirements for maintaining the integrity of our protective rated assemblies.

On this job site, the contact for fire stopping materials is: \_\_\_\_\_.

Along with rated assemblies, our facilities have very sensitive fire and smoke detection systems, as well as automatic sprinkler systems. If your activities will cause dust or vibration or impact, be aware and mitigate any adverse effect you may have on these systems.

On this job site, the contact for fire alarm systems is: \_\_\_\_\_.

If your work interrupts or disables any portion of the building's life safety systems, including fire alarm, fire suppression, and emergency egress, you may be required to implement interim life safety measures.

On this job site, the contact for interim life safety is: \_\_\_\_\_.

Much of our air is exhausted to the outside. If you are working around exhaust fans, you must know what areas the exhaust is coming from. Some exhausts are laden with radioactive elements. Some carry infectious diseases and other germs. Your supervisor will tell you about these areas.

On this job site, the hazardous exhaust areas are: \_\_\_\_\_.

Many of our patients depend on clean and fresh outside air to be provided to them. Smoking on roofs or around air intakes is strictly forbidden for this reason. If you must operate equipment on roofs or around air intakes, be certain to coordinate your work with the Facility Manager.

On this job site, the sensitive air intakes are: \_\_\_\_\_.

Much of our equipment may start without notice. Take care to avoid being harmed by unexpected starts, or unexpected discharges of steam, hot water, or chemicals. Unless you are authorized to be working around this equipment you should stay out of these spaces.

All work above the ceiling requires an Above Ceiling Work Permit, and all hot work requires a Hot Work Permit.

On this job site, the contact for Above Ceiling Work Permits is: \_\_\_\_\_.

On this job site, the contact for Hot Work Permits is: \_\_\_\_\_.

### Infection Control

Because many of our patients are ill, there is a chance that you will be exposed to germs. There is also a chance that you will expose our patients to germs you've brought from outside the hospital. We do our best to keep our physical environment clean and to control all infectious matter.

You can protect yourself by ensuring that your vaccinations are current, and by only going in places you are authorized to go. Wash or sanitize your hands frequently – especially after using the restroom and before eating. Never eat food anywhere except where you are told to have meal breaks. The Plumber's Rule No. 3 applies to everyone in healthcare: Don't bite your fingernails!

Your work may require an Infection Control Risk Assessment. The Facility Manager will help you determine when that is, and will help you through the process. This process helps identify the best ways to keep you and our patients safe from infections and other impediments to healing. Once the assessment is done, be certain to abide by all of its conditions.

On this job site, the infection control contact is: \_\_\_\_\_.

### A Clean Job Site

Throughout the work day, you will be responsible to maintain a reasonably clean job site. This makes it a safer place for you to work. It makes it a safer place for others to work, as well.

At the end of each work day, you will be responsible to leave all materials in an orderly state, remove all waste, scrap, and debris from the site, and leave the area broom clean. All potential hazards will be secured and made as safe as possible.

All construction waste and debris must be disposed of properly. Never use toilets or floor drains for this purpose. Cover all carts while moving debris through the facility, and use tacky mats to control dust tracking over floors.



## Our Expectation of Workmanship

It doesn't matter if you're a ventilation mechanic, an electrician, a painter, or a plumber. It doesn't matter if you're installing carpet, or ceiling tiles, or kitchen equipment, or cabinetry. Every piece of our facilities is in place to support the lifesaving and healing work we do.

The hard reality is that someone's life will literally depend on the quality of the workmanship you put into the jobs you do in Intermountain Healthcare facilities.

And it's another hard reality that someone you care for may very likely come to the facilities you helped build. Please do the kind of job you'd trust your loved one's life to.

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## **CONSTRUCTION SAFETY REQUIREMENTS**

- I. Outside Contractors and Intermountain Construction Employees performing construction activities on occupied Intermountain Healthcare property shall meet the following requirements. Stand-alone, new construction sites are not covered by these requirements. Outside Contractors will meet additional qualifications through the Supply Chain Organization Supplier Credentialing Procedure.
  - a. No work will be performed in any Intermountain Facility without prior approval and coordination with the accountable Facility Engineering Manager or Director.
  - b. Each outside contractor will have a Safety Program that complies with 29 CFR 1926 Subpart C. The Safety Program will be in writing.
  - c. Any chemical brought onto Intermountain Property must meet the following requirements:
    - i. Approved by the facility's Chemical Safety Officer,
    - ii. Accompanied by a current material safety data sheet,
    - iii. Stored in accordance with the chemical manufacturer's safety requirements in the appropriate labeled container.
    - iv. Where the chemical quantity is restricted for Healthcare Occupancies by NFPA 30 or other standards, it is the contractor's responsibility to provide for off-site storage.
    - v. The Contractor is responsible to comply with Intermountain's Hazardous Materials policy.
    - vi. The Contractor is responsible for the removal of all chemicals from Intermountain Property and for proper disposal in accordance with applicable laws and regulations.
  - d. No work will be performed without the completion of an Interim Life Safety and Infection Control Risk Assessment. These risk assessments will cover each phase of the construction project.
  - e. In existing facilities, an Asbestos inspection and any necessary abatement will be conducted prior to any renovation or remodel per the Hazmat policy.
  - f. Where work will cause noise or vibration, an assessment will be made following facility procedures to mitigate potential hazards to patients.
  - g. Above the Ceiling Permits
    - i. The Contractor will follow each facility's procedure for obtaining an above the ceiling work permit.
    - ii. No work will be performed prior to obtaining this permit.
  - h. Hot Work Permits
    - i. The Contractor will obtain a Hot Work Permit from Facilities Engineering prior to performing any hot work.
    - ii. The Contractor will provide a continuous and qualified fire watch for the duration and location specified by the Facility Engineering Director.
  - i. Confined Space Permits
    - i. The contractor will coordinate with the Intermountain Facility Engineering Director to assure that all requirements are met and a permit is completed prior to entering a permit required confined space.

- j. Control of Airborne Contaminants
  - i. The contractor will control all airborne dusts, mists, fumes, and vapors such that there is no exposure to Intermountain employees, patients, or visitors. This includes the generation of contaminants outside the building.
  - ii. If necessary, work will be conducted after hours to minimize potential exposures to staff, patients, and members of the public.
- k. Personal Protective Equipment.
  - i. PPE for head, eye, face, hand, foot, and respiratory protection is the responsibility of the contractor, and will be provided and worn as necessary for the exposure, except as follows:
    - 1. Hard Hats and Safety Glasses are required to be worn at all times when in the construction area. Hard hats may be removed when working in areas where the suspended ceiling grid has been completely installed.
  - ii. Fall Protection is the responsibility of the contractors and shall meet all 29 CFR 1926 requirements of the applicable Subparts.

**RESPONSIBILITY MATRIX**

Updated January 5, 2021

The following list identifies the majority of the items that are to be included in the capital project build-out. All Owner items need to be coordinated with A/E (Design Team), Contractor, and Owner (Facility Design & Construction and Supply Chain Facility Equipment Planners). For OFOI or OFCI items, Contractor is required to track equipment on construction schedule and to notify Owner of required delivery times taking into account for equipment lead times.

ITEM	OWNER/VENDOR	NOTES	ADDITIONAL NOTES		
			Data	Power	Backlog
<b>OFOI - (Owner Furnished / Owner Installed)</b>			<b>(Coordinate location of items with Owner and track within construction schedule)</b>		
Art	Owner / Owner (Alpine Art)	All artwork to be coordinated with Dan Kohler. Provide power to required artwork.			
Brochure Racks	Owner / Owner	Contractor to provide proper backing.			
Chart Racks	Owner / Owner (Midwest)	Contractor to provide proper backing.			
Copiers, fax	Owner / Owner	A/E to locate where copy/fax/printer is not visual clutter.	Yes	Yes	
Cup Dispensers	Owner / Owner				
Exam Tables	Owner / Owner			Yes	
Systems Furniture (including demountable partitions)	Owner / Owner (Midwest & Steelcase)	Coordinate modesty panels with elec. outlets. Sit/Stand desks to have modesty panel on front. Attention to be given to cord management. A/E to coordinate data and power with Midwest.	Yes	Yes	
Receptionist Desk	Owner / Owner (Midwest & Steelcase)	Owner furnished, Owner installed are noted on the drawings. The remaining desks are provided by the contractor.	Yes	Yes	
Moveable Metal Shelving	Owner / Owner				
Recliners / Draw Chairs	Owner / Owner				
Signage - Exterior	Owner / Owner (IG Group, YESCO)	Provide power and data to required exterior signage. Provide circuits for above ceiling signs. Coordinate thru-wall conduit sleeves with weather barrier. A/E to coordinate traffic signage and Contractor to install. Intermountain Logo Signs - (2) 20A Circuits - May vary. InstaCare and other Signs - (1) 20 A Circuits - May vary.	Yes	Yes	Yes
Signage - Interior (including Code Signage)	Owner / Owner (Scribbley, Hightech)	Provide power to required signage. Contractor to track in schedule and notify Owner for when Code Required signage is required to be installed.			
Radiology Equipment	Owner / Owner (See subject matter expert list)	A/E responsible to coordinate final site equipment drawings into Construction Documents from Owner's Vendor.	Yes	Yes	
Clinical Garbage Cans (Clinical, Office, PT, Etc.)	Owner / Owner				
Computers, Printers, Scanners, Keyboards, Mice, etc.	Owner / Owner	In-ceiling & wall mounts, conduits and boxes mounted by Contractor. Computers to be All-in-One, typ. in IMG exam rooms.	Yes	Yes	Yes
Televisions, Digital Projectors, similar devices, etc.	Owner / Owner	These items to be provided by Owner, but A/E to coordinate locations and infrastructure. Contractor to refer to OFCI section.	Yes	Yes	Yes
Keyboard Trays	Owner / Owner				
PACS	Owner / Owner				
Magnetic Marker Boards, Cork Boards, Huddle Boards, Idea Tracking Boards, etc.	Owner / Owner (Midwest)	A/E to coordinate location with Owner.			Yes
Emergency Evacuation Medical Sled (Med Sled)	Owner / Owner	A/E to coordinate location with Owner.			
Supply Area Panels	Owner / Owner	Contractor to provide proper backing, coordinate with Owner.			Yes
Audio/Video (AV)	Owner / Owner	Intermountain SCO will source & supply the A/V system including specialized cabling (e.g. HDMI, etc). Refer to CFCL section for Contractor requirements. A/E to identify locations on drawings, coordinate with Owner. Contractor to provide infrastructure, back boxes, conduits, pathways and cabling (from wall side back).	Yes	Yes	
Nurse Notification Call (NNC) System & Devices (Hospital Campus)	Owner / Owner (Hillrom)	Hospital local facility team to work with Supply Chain Facility Equipment Planning team to contract directly with Nurse Notification Call (NNC) system vendor (Hillrom) for devices, equipment, monitors, etc. A/E to coordinate with Owner and Hillrom for all NNC infrastructure required to support the device locations and types designated by Hillrom on their site specific drawings. Hillrom site specific drawings to be coordinated and included in the A/E Contract Documents. Contractor to provide all infrastructure including conduits, back boxes, cabling (e.g. home-runs to RCB, RCB to device, device to device, etc.), etc. for all NNC devices (e.g. RCB, GSR-10, room devices, etc.). The cabling for the NNC system will be coordinated and installed by the Contractor/Subcontractor (i.e. low voltage sub). Contractor to coordinate with Hillrom.	Yes; see CFCL	Yes; see CFCL	
Staff Assist Notification Call System & Devices (Medical Group Clinics on hospital campuses to match NNC system)	Owner / Owner (Hillrom)	Hospital local facility/IMG Ops team to work with Supply Chain Facility Equipment Planning team to contract directly with Staff Assist Notification Call system vendor (Hillrom) for devices, equipment, monitors, etc. (from wall side out). Staff Assist Notification system to be coordinated with Hospital Campus NNC system, as applicable, Medical Group Strategic Planner, and IMG Operations Officer. A/E to coordinate with Owner and Hillrom for all Staff Assist Notification Call system infrastructure required to support the device locations and types designated by Hillrom on their site specific drawings. Hillrom site specific drawings to be coordinated and included in the A/E Contract Documents. Contractor to provide all infrastructure including conduits, back boxes, cabling (e.g. home-runs to RCB, RCB to device, device to device, etc.), etc. for all NNC and Staff Assist Notification Call devices (e.g. RCB, GSR-10, etc.). The cabling for the NNC and Staff Assist Notification Call system will be coordinated and installed by the Contractor/Subcontractor (i.e. low voltage sub). Contractor to coordinate with Hillrom.	Yes; see CFCL	Yes; see CFCL	

Staff Assist Notification Call System & Devices (Stand-alone Medical Group Clinics)	Owner / Owner (Hillrom)	IMG Ops team to work with Supply Chain Facility Equipment Planning team to contract directly with Staff Assist Notification Call system vendor (Hillrom) for devices, equipment, monitors, etc. (from wall side out). Staff Assist Notification Call system to be coordinated with Medical Group Strategic Planner and Operations Officer. A/E to coordinate with Owner and Hillrom for all Staff Assist Notification Call system infrastructure required to support the device locations and types designated by Hillrom on their site specific drawings. Hillrom site specific drawings to be coordinated and included in the A/E Contract Documents. Contractor to provide all infrastructure including conduits, back boxes, cabling (e.g. home-runs to RCB, RCB to device, device to device, etc.), etc. for all Staff Assist Notification Call devices (e.g. RCB, GSR-10, etc.). The cabling for the Staff Assist Notification Call system will be coordinated and installed by the Contractor/Subcontractor (i.e. low voltage sub). Contractor to coordinate with Hillrom.	Yes; see CFCI	Yes; see CFCI	
Patient Monitoring System & Devices (Hospital Campus)	Owner / Owner	Hospital local facilities to work with Supply Chain Facility Equipment Planning team to contract directly with Patient Monitoring vendors for devices, equipment, monitors, etc. (from wall side out). A/E to identify locations on drawings, coordinate with Owner. Contractor to provide all infrastructure including conduits, back boxes, and home-run cabling from Patient Monitoring devices to TEC/TDR rooms that connect to Intermountain's network (Intermountain Siemon certified installer low voltage subcontractor to install). The Patient Monitoring system device to device cabling is by Vendor.	Yes	Yes	
IV Hangar	Owner / Owner	A/E to identify locations on drawings, coordinate with Owner. Backing to be coordinated, if required.			
Sharps Disposal Container	Owner / Owner (Stericycle)	A/E to identify locations on drawings, coordinate with Owner. Backing to be coordinated, if required.			
Infant/Pediatric Security System	Owner / Owner (Totguard)	A/E to identify locations on drawings. This system is to be coordinated with Owner, Women's and Children's Operations, Clinical Programs and Security.	Yes	Yes	
<b>OFCI - (Owner Furnished / Contractor Installed) (Coordinate location of items with Owner and track within construction schedule)</b>			<b>Data</b>	<b>Power</b>	<b>Backing</b>
Automated External Defibrillator (AED)	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner, A/E to coordinate recess, semi-recessed, or surface mount options with Owner.			Yes
Time Clocks	Owner / Contractor	Conduit and boxes by Contractor, Coordinate location with Owner.	Yes	Yes	
Paper Towel Dispensers	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
Soap Dispensers	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
Toilet Paper Dispensers	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
Sanitary Napkin Dispensers/Receptacles	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
Diaper Changing Station	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.			Yes
Hand Sanitizer Dispensers (Avagard)	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
Hall Intersection Mirrors	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.			Yes
Diagnostic Board (Otoscope / Ophthalmoscope)	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.		Yes	
Stadiometers, Recessed Scales	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner; coordinate power.		Yes	
Procedure Lights	Owner / Contractor	A/E to coordinate with Owner and Owner's selected equipment Vendor; A/E to identify locations on drawings, coordinate with Owner; A/E to coordinate the design of the procedure light support structure into drawings. Contractor to provide and install procedure light support structure.		Yes	Yes
Scrub Sinks & Carriers	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner. Contractor to coordinate with Owner for ordering and for install coordination.			Yes
IV Track	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner. Backing to be coordinated, if required.			Yes
Boom Mounting Plates (Equipment, Lighting, Anesthesia)	Owner / Contractor	A/E to coordinate with Owner and Owner's selected equipment Vendor; A/E to identify boom locations on drawings, coordinate with Owner; A/E to coordinate the design of the boom support structure into drawings. Final site specific equipment drawings from Vendor to be coordinated with Construction Documents. Contractor to coordinate with Owner and install boom support structure and boom mounting plates. Contractor to coordinate with Owner for ordering and install of boom mounting plates.	Yes	Yes	Yes
OR Clocks	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner. Contractor to coordinate with Owner for ordering and install coordination.	Yes	Yes	Yes
Clinical Clocks	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner. Contractor to coordinate with Owner for ordering and install coordination.		Yes	Yes
Shower Curtains & Rods	Owner (Medline) / Contractor	A/E to identify locations on drawings, coordinate with Owner. Contractor to coordinate with Owner for ordering and install coordination.			
Cubicle Curtains & Tracks	Owner (Medline) / Contractor	A/E to identify locations on drawings, coordinate with Owner. Contractor to coordinate with Owner for ordering and install coordination.			
Digital Projector Mounts, TV Mounts, & Computer Mounts (Ergotron Brackets/Mounts, etc.)	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner. Contractor to coordinate with Owner for ordering and install coordination. In-ceiling & wall mounts, conduits and boxes provide and installed by Contractor A/E to coordinate A/V requirements. Contractor to pull required A/V cabling.	Yes	Yes	Yes
Radiation Protection Calculations and Certification	Owner / Contractor	A/E to coordinate with Owner in the design phase for coordinating with Medical Physicists Consultants or others, when required. Contractor to coordinate prior to Gyp. Bd. install.			Yes
Patient Lifts	Owner (Liko, subsidiary of Hillrom) / Contractor	A/E to identify locations on drawings, coordinate with Owner. A/E to design required support structure for Contractor to install for necessary Liko patient lift connections (e.g. pendant / rails / etc). Contractor to coordinate shop drawings and installation requirements prior with Liko. Connect to equipment branch if provided.		Yes	

Building Alarms / Medication Refrigerator Alarm / Pharmacy Alarm System	Owner / Contractor	A/E to identify locations and infrastructure on drawings, coordinate with Owner. Contractor to provide conduit and infrastructure into accessible ceiling for access from equipment and/or devices. Local Facility to contract with alarm company for alarm, wire, and monitoring.		Yes	
UPS (MRI, Data Room, CPU, or other similar equipment)	Owner / Contractor	A/E to identify equipment locations on drawings, coordinate with Owner.	Yes	Yes	Yes
iCentra Tracking Boards	Owner / Contractor	A/E to identify locations on drawings, coordinate with Owner.	Yes	Yes	Yes
Distributed Antenna System (DAS) including Public Safety	Owner (DAS vendor selected and managed by Intermountain CTIS/Telecom) / Contractor	A/E to locate infrastructure on drawings to simplify the DAS install. Contractor to track on construction schedule and coordinate DAS install with Owner's Vendor.			
Alertus - Mass Notification System (Public Areas)	Owner (Alertus) / Contractor	A/E to identify locations on drawings, coordinate with Owner.	Yes	Yes	
<b>CFCI - (Contractor Furnished / Contractor Installed)</b>			Data	Power	Backing
Blinds/Shades (manual and powered)	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner.		Yes	
Apron Hooks/Rack (Heavy Duty in Radiology)	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner.			Yes
Communication Boards (e.g. Patient Rooms)	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner.			Yes
Emergency Phones, Kiosks - Exterior	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner. Conduit and boxes by Contractor.	Yes	Yes	Yes
Med Gas Certification	Contractor / Contractor (Mountain Medical)	Contractor to coordinate Vendor with Owner			
Emergency Shower Station / Eye Wash Station	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner. These shall meet ANSI and Owner requirements.			
Fire Extinguishers	Contractor / Contractor	A/E to identify types and locations on drawings, coordinate with Owner. 10 lbs. minimum - refer to Intermountain Design Guidelines & Construction Standards.			Yes
Grab Bars (Rest rooms, Radiology, Exam rooms, etc.)	Contractor / Contractor	A/E to identify locations on drawings.			Yes
Coat Hooks (Rest rooms/showers, Exam rooms, Offices/Workstations only)	Contractor / Contractor	A/E to identify locations on drawings.			
Mirrors (Rest rooms, Exams, Radiology, Rehab, etc.)	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner.			Yes
Pneumatic Tube Systems	Contractor / Contractor (SwissLog, Atreo Group, or other approved)	A/E to identify locations on drawings, coordinate with Owner. If SwissLog, verify pricing is per Intalere (Amerinet) Contract Agreement. Design assistance fees are included in this agreement.	Yes	Yes	
Plumbing Shrouds	Contractor / Contractor				
Security Cameras, Video Surveillance	Contractor / Contractor (AlphaCorp/Convergint)	A/E to identify locations on drawings, coordinate with Owner.	Yes		
Voice/Data Cabling (all horizontal cabling)	Contractor / Contractor (Cache Valley Elec., IES Commercial, Data Tech Professionals, Hunt Electric, and others listed in Intermountain Div. 27)	Refer to Division 27 in the Intermountain Design Guidelines and Construction Standards. Coordinate with Owner/User on connections, pairs of fiber/copper, conduits, inner-ducts, etc.	Yes		
Support Bracing/Structure for Radiology and similar equipment	Contractor / Contractor	A/E to coordinate with Owner and Owner's selected Radiology equipment Vendor; A/E to coordinate the design of the support bracing/structure into drawings. Final site specific equipment drawings from Vendor to be coordinated with Construction Documents. Contractor to coordinate with Owner for install of support structure.	Yes	Yes	Yes
Wall Protection (Incl. Bumper and Corner Guards)	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
Intrusion Detection	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
Access Control, Card Readers (Lenel)	Contractor / Contractor (AlphaCorp/Convergint)	A/E to identify locations on drawings, coordinate with Owner.			
Communication Cabling	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
TV System Distribution	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner.			
Audio/Video (AV)	Contractor / Contractor	Intermountain SCO will source & supply the A/V system including specialized cabling (e.g. HDMI, etc). A/E to identify locations on drawings, coordinate with Owner. Contractor to provide infrastructure, back boxes, conduits, pathways and misc. cabling (from wall side back).	Yes	Yes	
Nurse Notification Call (NNC) System - Low Voltage Cabling (Hospital Campus)	Contractor / Contractor (Hillrom)	A/E to coordinate with Owner and Hillrom for all NNC infrastructure required to support the device locations and types designated by Hillrom on their site specific drawings. Hillrom site specific drawings to be coordinated and included in the A/E Contract Documents. Contractor to provide all infrastructure including conduits, back boxes, cabling (e.g. home-runs to RCB, RCB to device, device to device, etc.), etc. for all NNC devices (e.g. RCB, GSR-10, etc.). The cabling for the NNC system will be coordinated and installed by the Contractor/Subcontractor (i.e. low voltage sub). Contractor to coordinate with Hillrom.	Yes	Yes	
Staff Assist Notification Call System - Low Voltage Cabling (Medical Group Clinics on hospital campuses to match NNC system)	Contractor / Contractor (Hillrom)	A/E to coordinate with Owner and Hillrom for all Staff Assist Notification Call system infrastructure required to support the device locations and types designated by Hillrom on their site specific drawings. Hillrom site specific drawings to be coordinated and included in the A/E Contract Documents. Contractor to provide all infrastructure including conduits, back boxes, cabling (e.g. home-runs to RCB, RCB to device, device to device, etc.), etc. for all NNC and Staff Assist Notification Call devices (e.g. RCB, GSR-10, etc.). The cabling for the NNC and Staff Assist Notification Call system will be coordinated and installed by the Contractor/Subcontractor (i.e. low voltage sub). Contractor to coordinate with Hillrom.	Yes	Yes	
Staff Assist Notification Call System - Low Voltage Cabling (Stand-alone Medical Group Clinics)	Contractor / Contractor (Hillrom)	A/E to coordinate with Owner and Hillrom for all Staff Assist Notification Call system infrastructure required to support the device locations and types designated by Hillrom on their site specific drawings. Hillrom site specific drawings to be coordinated and included in the A/E Contract Documents. Contractor to provide all infrastructure including conduits, back boxes, cabling (e.g. home-runs to RCB, RCB to device, device to device, etc.), etc. for all Staff Assist Notification Call devices (e.g. RCB, GSR-10, etc.). The cabling for the Staff Assist Notification Call system will be coordinated and installed by the Contractor/Subcontractor (i.e. low voltage sub). Contractor to coordinate with Hillrom.	Yes	Yes	
Patient Monitoring System & Devices (Hospital Campus)	Contractor / Contractor	A/E to identify locations on drawings, coordinate with Owner. Contractor to provide all infrastructure including conduits, back boxes, and home-run cabling from Patient Monitoring devices to TEC/DR rooms that connect to Intermountain's network (Intermountain Siemon certified installer low voltage subcontractor to install). The Patient Monitoring system device to device cabling is by Vendor.	Yes	Yes	

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**SECTION 01 10 00 - SUMMARY**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Work covered by the Contract Documents.
  - 2. Use of premises.
  - 3. Code compliance
  - 4. Dust control
  - 5. Protection of existing improvements
  - 6. Traffic Control
  - 7. Temporary Controls

## 1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Project consists of remodel of an existing imaging reception area at Logan Regional Hospital. This project is located on the 2<sup>nd</sup> floor at the Imaging Registration. The scope of the project includes demolition of the existing Imaging reception, cashier, and registration areas to create a new open reception/registration area, office areas, and relocated corridor equipment alcove. Scope of work includes Architectural, Mechanical and Electrical.

- B. Total square feet = **815**.

Project Location: Logan Regional Hospital  
Address: 550 East 1440 North, Logan, UT 84341

- C.
  - 1. Owner: Intermountain Healthcare, 36 South State Street, 21st Floor  
Salt Lake City, Utah 84111
  - 2. Owner's Representative: Milt White, North Region Construction Director

Architect: NJRA Architects, 5272 College Drive, Suite 104, Murray, Utah 84123.

- D. The Work consists of the following:

- 1. The Work includes: architectural, mechanical, and electrical work as defined on the contract documents.

## 1.4 USE OF PREMISES

- A. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.

## 1.5 CODE COMPLIANCE

- A. All work shall comply with current edition of codes including but not limited to the following:
  - 1. International Building Code
  - 2. International Mechanical Code
  - 3. International Plumbing Code
  - 4. NFPA
  - 5. National Electric Code
  - 6. OSHA Regulation
  - 7. Health and Safety Regulations
  - 8. Utility Company Regulations
  - 9. Police, Fire Department Rules
  - 10. Environmental Protection Regulations
  - 11. Americans with Disabilities Act
- B. Arrange for authorities having jurisdiction to inspect and test according to their requirements and for each temporary utility before use. Obtain required certifications and permits.
- C. Requirements of codes and regulations shall be considered as the minimum. Where the contract documents exceed (without violating) code and regulation requirements, contract requirements shall take precedence. Where codes conflict, the more stringent shall apply.

## 1.6 DUST CONTROL

Temporary partitions should be constructed as called out on the Contract Documents and as mentioned in specification Section 024119 – Selective Demolition.

## 1.7 PROTECTION OF EXISTING IMPROVEMENTS

- A. Take precautions necessary to protect all existing utilities, monitor wells, and other Site improvements to remain from damage due to the work of this Project.
- B. Provide restoration of damaged property if damage is a result of construction activities.

1.8 TRAFFIC CONTROL

- A. Maintain control of vehicular and pedestrian traffic caused by, or resulting from, the work of this Project.
- B. Means of control shall be in accordance with the applicable regulations of the jurisdiction responsible for traffic safety.

1.9 TEMPORARY CONTROLS

- A. Conform to all applicable state and local ordinances and regulations. Obtain and pay for necessary permits and licenses as required by local jurisdictions.

END OF SECTION

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**SECTION 01 23 00 - ALTERNATES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. **ADDITIVE ALTERNATE #1:** Remove existing perimeter wall wash light fixture and terminate power as required. Extend ceiling grid and tile to infill removed light fixture – see electrical drawings.
- B. **ADDITIVE ALTERNATE #2:** Remove all existing can lights in Radiology waiting area ceiling and provide new 2x4 LED light fixtures to match existing. See electrical drawings. Replace ceiling tile where lights are being removed.

END OF SECTION

**SECTION 01 29 00 – PAYMENT PROCEDURES**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes measurement and payment provisions for, but not limited to, the following:
  - 1. Materials Delivered but Not Yet Installed.
  - 2. Schedule of Values.
  - 3. Applications for Payment.
  - 4. Preliminary Progress Schedule.
  - 5. Construction Progress Schedule.
  - 6. Change Orders.

## 1.2 MATERIALS DELIVERED BUT NOT INSTALLED

- A. Exclude from Applications for Payment materials or equipment delivered and stored, but not yet incorporated into the Work, unless circumstances dictate acceptance (i.e. pre-purchase of equipment for early delivery to prevent delay of construction or subsequent facility opening date) and pre-payment is agreed to, in writing, by the Owner.
- B. If Owner has agreed to make early payment on account of materials or equipment not incorporated in the Work, but delivered and stored in conformance with the requirements of the Contract Documents, at the site, or at some other location agreed upon in writing, such pre-payment shall be conditioned upon approval by Contractor's Insurance Carrier, and Architect, in writing, prior to submission by Contractor of the applicable payment request.
- C. Pre-payment request shall contain substantiating documentation, including:
  - 1. Bill(s) of Sale.
  - 2. Evidence of insurance for the materials or equipment, covering the item(s) until completion of installation.
  - 3. Provision for transportation to the Project Site.
  - 4. Protection of Owner's interest under any circumstance (i.e. Owner's right to retrieve equipment or materials from storage area of a bankrupt company's property).
  - 5. Provision for inspection/testing at the stored location.

6. Provision for security until completion of installation.

### 1.3 SCHEDULE OF VALUES

- A. Type schedule on AIA Document G703. Owner's Standard Invoice/Schedule of Values or Contractor's standard forms and automated printout equivalent to the AIA Document will be considered for approval by Owner upon Contractor's request. Identify schedule with:
  1. Title of Project and location.
  2. Architect and Project number.
  3. Name and Address of Contractor.
  4. Contract designation.
  5. Date of submission.
- B. Schedule shall list the installed dollar value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. List each subcontract first using the Table of Contents of the Project Manual as the format.
  1. Next list any allowances included in the contract amount.
  2. List each major section or portion of work to be performed by the Contractor.
  3. List Contractor's fee separately.
  4. List any contingencies.
  5. Identify each line item with the number and title of the respective major section of the specifications.
  6. Subdivide items to correspond with cost correlation requirements for construction progress schedule.
- D. For each major line item list sub-values of major products by building area or floor level or other operations under the item.
- E. For the various portions of the Work:
  1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
  2. For items on which progress payments will be requested for stored materials, break down the value into:
    - a. The cost of the materials, delivered and unloaded, with taxes paid.



- b. The total installed value.
- B. The sum of all values listed in the schedule shall equal the total Contract Sum.
- C. Refer to General Conditions, Article 12, for changes.

#### 1.4 APPLICATIONS FOR PAYMENT

- A. Format and Data Required:
  - 1. Submit applications typed on AIA Document G702/703, Application for Payment. Contractor's standard forms and automated print-out equivalent to the AIA Document will be considered for approval by Architect upon request by the Contractor.
  - 2. Submit 2 copies with "wet" signatures.
  - 3. Add provision for Inspector of Record's signature.
- B. Provide itemized data on continuation sheet:
  - 1. Format, schedules, line items and values: Those of the Schedule of Values accepted by Architect.
  - 2. Include Payment Application number.
- C. Preparation of Application for Each Progress Payment:
  - 1. Application Form:
    - a. Fill in required information, including that for Change Orders executed prior to date of submittal of application along with the number assigned to each Change Order.
    - b. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
    - c. Certification that the Project Record Documents are current with the progress status of the Project.
    - d. Execute certification with signature of a responsible officer of Contract firm.
  - 2. Continuation Sheets:
    - a. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.
    - b. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
      - 1) Round off values to nearest dollar, or as specified for Schedule of Values, and percent of item completion.

- c. List each Change Order executed prior to date of submission, at the end of the continuation sheets.
  - 1) List by Change Order number, and description, as for an original component item of work.
- D. Substantiating Data for Progress Payments:
  1. When Owner or Architect requires substantiating data, submit information, with a cover letter identifying:
    - a. Project.
    - b. Application number and date.
    - c. Detailed list of enclosures.
    - d. For stored products.
      - 1) Item number and identification as shown on application.
      - 2) Description of specific Material.
  2. Submit 1 copy of data and cover letter for each copy of application.
  3. Revised updated CPM schedule.
  4. Current period's General Contractor Conditional Waiver and the prior period's Unconditional Waiver.
  5. Waivers from Subcontractors.
  6. Copies of invoices for National Purchase Agreement (NPA) items.
  7. Corrections and updates to "as-built" documents.
- E. Preparation of Application for Final Payment:
  1. Fill in application form as specified for progress payments.
  2. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700 - CONTRACT CLOSEOUT.
- F. Submittal Procedure:
  1. Submit Applications for Payment to Owner at the times stipulated in the Agreement.
  2. Number: 3 copies of each Application.
  3. When Owner, Inspector of Record, and Contractor agree on percentages to be requested, and when agreed and signed by them and Architect, Architect will transmit the Certificate for Payment to

Owner.

4. Approval and signing of the Application for Payment by Owner and Architect is contingent upon approval of the current status of the As-Built Drawings/Record Documents and submittal of updated CPM schedule.

#### 1.5 CHANGE ORDERS

- A. Change Orders shall be processed by the Architect in accordance with the Conditions of the Contract, Supplementary Conditions of the Contract, and as herein specified.
- B. Coordination with Contractor's Submittals:
  1. Revise Schedule of Values and Application for Payment forms monthly to record each change as a separate item of Work, and to record the adjusted Contract Sum.
  2. Upon completion of work under a Change Order, enter pertinent changes in record documents.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

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**SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION**

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section describes the requirements for Project coordination.

1.2 DESCRIPTION OF REQUIREMENTS

- A. Minimum administrative and supervisory requirements necessary for coordination of Work shall be fulfilled collectively by the Contractor in coordination with subcontractors including, but not necessarily limited to, the following:

1. Coordination drawings.
2. Coordination meetings.
3. Administrative coordinating personnel.
4. Contractor's coordination of work.

1.3 COORDINATION MEETINGS

- A. Schedule and conduct meetings and conferences at project site, unless otherwise indicated.

1.4 ADMINISTRATIVE COORDINATION PERSONNEL

- A. Provide a General Superintendent and other administrative and supervisory personnel required for performance of the Work.
- B. Provide specific coordinating personnel for each subcontractor as reasonably required for interfacing Work with other work of total Project.
- C. Submittal of Staff Names, Duties: Within 7 days of Notice to Proceed submit to the Owner a listing of principal staff assignments and consultants, including names, addresses and telephone numbers.

1.5 CONTRACTOR'S COORDINATION OF WORK

- A. Provide and coordinate the following:
  1. General and special services and operations to furnish and install Work.
  2. Primary, major and accessory materials, and items necessary to complete the installation.
  3. Labor operations and material items reasonably incidental for finishing.

4. Performance of work and delivery of materials in accordance with established construction schedules.
- B. Coordinate all aspects of construction operations, generally, and specifically as required to provide Owner with a complete, operable facility.
1. Resolve any dispute over coordination, or failure to coordinate, such that resolution is consistent with Contract Documents. When such resolution is not possible, refer to the General Conditions.
  2. Where proper execution of this Work depends on the work of any other contractor, inspect and promptly report to Architect any defects in such work that render it unsuitable for such proper execution and results.
  3. Cooperate with other contractors on the Project site and with Architect so that completion of all work can proceed with prudent speed.
    - a. Furnish other contractors, whose work is fitted to this work, detail and erection drawings giving full information regarding the fabrication and assembly of this Work.
    - b. So far as possible, drawings shall indicate checked field measurements.
    - c. Cooperate in timing this Work to join with the work of other contractors or the Owner.
  4. Check the drawings of other contracts for interferences with this Work and promptly report to Architect, in writing, any such interferences.
  5. Submit complete information, including Drawings, descriptions, sketches, marked prints, etc., as required for Architect's review and coordination of drawings by others which are a part of this Work.
- C. Mechanical, Electrical, and Related Systems Coordination: Prior to proceeding with the work, and before installation, coordinate and work out all "tight" conditions involving work of various Sections.
1. Before work proceeds in these areas, prepare supplemental drawings for review by the Architect.
  2. Provide all work necessary to coordinate tight conditions, including supplemental drawings in sufficient detail for showing that all work is coordinated in "tight" areas, and additional labor and materials necessary to overcome "tight" conditions at no increase in cost to the Owner.
  3. Coordination of "tight" conditions shall include:
    - a. Providing sufficient clear space around all equipment necessary for maintenance access and as required by Code.

- b. Adjustments in depth, position, and elevation of underground and overhead utilities at points of conflict. Utility space conflicts shall be resolved by giving precedence to those utilities which are called out to be sloped. The term "utility" as used in this paragraph includes: all piping, conduit, and ductwork.

## 1.6 COORDINATION DRAWINGS

- A. Submit plans and cross-sections in sufficient detail to show coordinated layout of all ducts, pipes, electrical work, access doors, above ceiling clearances, canopy rigging, acoustical curtains, and other related items. Plans and cross-sections shall be provided that include all underground ducts, electrical ductbanks, piping, and other underground utilities.
- B. Engage professional drafter to prepare these drawings to one-quarter scale on Auto-CAD with title blocks to match the Contract Drawings.
  1. These plans shall reflect existing dimensions as field-verified by the Contractor.
  2. Plans shall be uniform and identical and shall serve as backgrounds for preparation of shop or layout drawings required under Divisions 15 and 16 and ultimately for recording of as-built information required under these divisions.
  3. Where additional sheets of elevations, sections, details, and/or diagrams are required, such sheets shall match the Contract Drawings with respect to size and title block.
  4. Prior to beginning excavation for structural footings and utilities, submit a coordination plan showing all underground utilities including: all underground piping, underground ductwork, electrical and communication ductbanks.
    - a. The plan shall be a composite overlay of sheets each dedicated to a single underground utility using a common background and scale.
    - b. Dimensions shall be sufficient to clearly indicate the position and depth of each utility relative to structural footings, above grade structures, and finished grade.
    - c. At points where the plan indicates that utilities will cross each other, cross a structural footing, or run within six (6) feet parallel to either each other or a structural footing, provide a cross section drawing.
    - d. Cross section drawings shall clearly show the relative positions and depths of each utility and structural footing.
    - e. The composite plan and cross section drawing(s) shall be updated to "as-builts" and submitted with the Project Record (As-Built) Drawings.

C. Do not commence work until the Architect has reviewed these Drawings.

1.7 MISCELLANEOUS PROVISIONS

A. Prior to starting a particular type or kind of work:

1. Examine for relevant information, all Contract Documents and subsequent data issued;
2. Check accepted submittals and verify dimensions at job site;
3. Consult manufacturers for instructions applicable to conditions under which Work is to be installed;
4. Inspect areas, surfaces or construction receiving the Work.
  - a. Start of work shall signify compliance with the above requirements and acceptance of previously placed construction or substrates as being in satisfactory condition to achieve proper installations and first quality workmanship as intended under these specifications.
  - b. Failure to so inspect and report shall constitute an acceptance of the other contractor's work.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION



**SECTION 01 31 10 – FIELD ENGINEERING**

## PART 1 - GENERAL

## 1.1 FIELD MEASUREMENTS AND EXISTING CONDITIONS

- A. Contractor Responsibility: Exact field measurements are responsibility of the Contractor. Any required off-sets, additional fittings, re-routing of existing or new work to provide serviceable system within the location shown, and to maintain head room and clearances to match existing construction, are responsibility of the Contractor.
- B. Layout of the Work: The Contractor shall employ, at the Contractor's own expense, Registered Civil Engineer or Licensed Land Surveyor. Contractor's engineer or surveyor will provide layout of the work of the Project and establish all reference points and elevations required for construction.

## 1.2 GRADES, LINES AND LEVELS

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- C. Benchmarks: Establish and maintain a minimum of six permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Preservation: All stakes, boundary lines, bench marks or survey marks, etc., which have been or may be established in any part of the Project site or adjacent thereto shall be carefully preserved and respected by the Contractor and shall be restored at the Contractor's expense if lost or destroyed as result of the Contractor's operations.
  - 1. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

- E. Conflict: The Contractor will be held responsible for correctness of layout, for establishing location of existing concealed utility lines, and for notifying the Architect in writing in event of conflict with the Drawings. In such case, the Contractor shall not proceed until instructed by the Architect.
- F. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, plumbness and elevations of construction and sitework.
- G. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
  - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

END OF SECTION

**SECTION 01 33 00 - SUBMITTAL PROCEDURES**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

## 1.3 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities. Submittals should be submitted by contractor to architect **within 30 days from notice to proceed**.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Resubmittal Review: Allow 10 days for review of each resubmittal.
- E. Identification: Place a permanent label or title block on each submittal for identification.
  - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
  - 2. Include the following information on label for processing and recording action taken:
    - a. Project name.

- b. Date.
  - c. Name and address of Architect.
  - d. Name and address of Contractor.
  - e. Name and address of subcontractor.
  - f. Name and address of supplier.
  - g. Name of manufacturer.
  - h. Submittal number or other unique identifier, including revision identifier.
  - i. Number and title of appropriate Specification Section.
  - j. Drawing number and detail references, as appropriate.
  - k. Location(s) where product is to be installed, as appropriate.
- F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form.
- G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.
1. Use for Construction: Use only final submittals with mark indicating "Approval notation from Architect's action stamp".

## PART 2 - PRODUCTS

### 2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. Mark each copy of each submittal to show which products and options are applicable.
  2. Include the following information, as applicable:
    - a. Manufacturer's written recommendations.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions.
    - d. Standard color charts.
    - e. Manufacturer's catalog cuts.
    - f. Standard product operation and maintenance manuals.
    - g. Compliance with specified referenced standards.
  3. Submit Product Data concurrent with Samples.
  4. Number of Copies: Submit four copies of Product Data, unless otherwise indicated.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.
    - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    - f. Shopwork manufacturing instructions.
    - g. Schedules.
    - h. Design calculations.
    - i. Compliance with specified standards.
    - j. Relationship to adjoining construction clearly indicated.
  2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
  3. Number of Copies: Submit four opaque copies of each submittal, Architect will retain two copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

### 3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal

with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

END OF SECTION

**SECTION 01 40 00 – QUALITY REQUIREMENTS**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section describes the requirements for Owner furnished testing and inspection services which include the following:
  - 1. Observation by Inspector of Record.
  - 2. Laboratory responsibilities.
  - 3. Laboratory reports.
  - 4. Limits on testing laboratory authority.
  - 5. Contractor responsibilities.
  - 6. Schedule of inspections and tests.
- B. These services are identified to indicate the requirement for cooperation and assistance needed by Owner's testing and inspection agency.

## 1.2 QUALITY ASSURANCE

- A. Testing and Inspection Agency Qualifications: A testing and inspection agency must have a minimum 5 years continuing experience preceding date of these Contract Documents, and be qualified in accordance with the following American Society for Testing and Materials (ASTM) publications:
  - 1. ASTM E 548-84 Standard Practice for Generic Criteria for use in the Evaluation of Testing and Inspection Agencies.
  - 2. ASTM E 699-79 (1984) Standard Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E-6.
- B. Testing Equipment: Calibrated at intervals with devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

## 1.3 INSPECTION AND TESTING PERSONNEL AND FACILITIES

- A. Inspector of Record:
  - 1. The Owner will employ one or more qualified Inspectors of Record, acceptable to the Local Building Department issuing Permits who will be employed continuously at the construction site, working under the Owner Representative's general direction. The IOR(s) will observe progress of the work and to report to the Owner any non-conformance

with Contract Documents.

2. In compliance with the State Building Code, Part 1, Title 24 of the California Code of Regulations, Article 7-145, the Inspector of Record shall have personal knowledge, obtained by continuous inspection of all parts of the work of construction in all stages of its progress, to ensure that the work is in accordance with the approved contract documents.
3. Specific duties and limits of responsibilities include the following:
  - a. Observing and spot checking materials upon arrival at site, and work in progress, to determine conformance with Contract Documents. Reporting any defects immediately to the Owner.
  - b. Maintaining liaison with the Contractor and his Subcontractors only through Contractor's superintendent.
  - c. Evaluating Contractor's suggestions and reporting them with recommendations to the Owner for final decision.
  - d. Remaining alert to the Construction Schedule and immediately reporting any potential delays and problems to the Owner.
  - e. Maintaining a Daily Log of activities on site, pertinent to a continuous project report record.
  - f. Preparing a Verified Report every 3 months (or sooner if required for a specific project schedule).
  - g. Receiving Samples of construction materials at the jobsite.
  - h. Scheduling and accompanying regulatory inspectors through the project and reporting to the Owner the results of such inspection visits.
  - i. Being alert to conditions which could affect Hospital's existing operation.
  - j. Reviewing and verifying degree of work completion with that cited in Contractor's monthly payment request.
  - k. Maintaining Contract information and Shop Drawing files.
  - l. Preparing a Field Inspection Report of incomplete or unsatisfactory work at intervals throughout the work progress. Checking off such items when made complete and satisfactory by Contractor.
  - m. Attending project meetings in accordance with specifications Section 013100.
  - n. Enforcing Infection Control requirements.





required by CCR, Title 22 and as directed.

#### 1.4 LABORATORY REPORTS

A. After each inspection and test, promptly submit copies of laboratory report which includes:

1. Date issued,
2. Project title and number,
3. Name of Inspector from inspection agency,
4. Date and time of sampling or inspection,
5. Identification of product and specifications section,
6. Location in the Project,
7. Type of inspection or test,
8. Date of test,
9. Results of tests,
10. Conformance with Contract Documents,
11. Whether original test or re-test,
12. State/local permit number,

B. Reports shall be distributed to the following:

1. Architect of Record
2. Inspector of Record (I.O.R.)
3. General Contractor
4. Owner.
5. Applicable Consultant
6. Local Jurisdiction where applicable

#### 1.5 LABORATORY RESPONSIBILITIES

A. Provide qualified personnel at site. Cooperate with Architect/Inspector of Record and Contractor in performance of services.

B. Perform specified inspecting, sampling, and testing of Products in accordance with specified standards.

- C. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- D. Promptly notify Architect, IOR and Contractor of observed irregularities or non-conformance of Work or Products.
- E. Perform additional inspection and test required by Architect.
- F. Attend preconstruction meetings and progress meetings when requested.

#### 1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with Inspector of Record and Testing and Inspection Agency and provide access to Work, including off-site manufacturer's or fabricator's operations.
  - 1. Provide required quantities of material samples to be tested.
  - 2. Samples will be selected and taken by representative of Testing and Inspection Agency.
- B. Furnish copies of product data and test reports as required.
- C. Furnish incidental labor and facilities:
  - 1. To provide access to work to be tested;
  - 2. To obtain and handle samples at the Project site, or at the source of the Product to be tested or inspected;
  - 3. To facilitate inspections and tests, and;
  - 4. For storage and curing of test samples at the Project site.
- D. Provide, on a weekly basis, a Short Interval Project Schedule with a minimum three-week duration which identifies upcoming testing requirements.
- E. Schedule the tests and inspections required by the Contract Documents and applicable codes and regulations with the Inspector of Record and the Testing and Inspection Agency, a minimum of 48 hours in advance.
  - 1. When tests or inspections cannot be performed after such notice, or if re-tests and re-inspections are required due to the fault of the Contractor, all costs for such re-work shall be deducted from the Contract Amount. If the remaining unpaid balance in the Contract is insufficient to cover the Change Order for this work, Contractor shall pay the difference directly to the Owner.
  - 2. Do not cover corrected Work until said Work has been re-tested and or re-inspected satisfactorily.

- F. Arrange with Owner's Testing and Inspection Agency and pay for additional samples and tests required for the Contractor's convenience when approved by Owner.
- G. Contractor shall pay costs for the following specified items:
  - 1. Design mixes for:
    - a. Cast-in-Place concrete
    - b. Asphalt paving
  - 2. Redesign of mixes due to change in source of ingredients.
  - 3. Certified mill test reports.
  - 4. Pre-construction tests for masonry units.
  - 5. Preparation and delivery to laboratory of pre-construction masonry prisms for testing.
- H. Notification of Architect:
  - 1. In addition to tests and inspections called for in this Section, notify applicable parties of inspections and testing called for in the individual Sections of the Specifications or on the Drawings.
  - 2. Notify 48 hours in advance, to assure inspections prior to covering up or closing in of work involved. Any work covered up before such required inspection or testing shall be uncovered or removed at the Contractor's expense.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

**SECTION 01 43 73**

**SCHEDULE OF VALUES**

**NAME OF BIDDER:** \_\_\_\_\_

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

<b>DIV</b>	<b>TITLE</b>	<b>AMOUNT</b>	<b>\$/SQ. FT</b>	<b>COMMENTS</b>
01	General Conditions	\$ _____	\$ _____	
02	Demolition	\$ _____	\$ _____	
02	Saw cut slab	\$ _____	\$ _____	
03	Concrete	\$ _____	\$ _____	
04	Masonry	\$ _____	\$ _____	
05	Steel	\$ _____	\$ _____	
06	Woods and Plastics	\$ _____	\$ _____	
07	Thermal and Moisture Protection	\$ _____	\$ _____	
08	Openings	\$ _____	\$ _____	
09	Finishes	\$ _____	\$ _____	
10	Specialties	\$ _____	\$ _____	
12	Furnishings	\$ _____	\$ _____	
21	Fire Suppression	\$ _____	\$ _____	
22	Plumbing	\$ _____	\$ _____	
23	HVAC	\$ _____	\$ _____	
26	Electrical	\$ _____	\$ _____	
31	Earthwork	\$ _____	\$ _____	
32	Landscape	\$ _____	\$ _____	
33	Utilities	\$ _____	\$ _____	
	<b>SUBTOTAL</b>	\$ _____	\$ _____	
	<b>OVERHEAD AND PROFIT</b>	\$ _____	\$ _____	
	<b>TOTAL COST</b>	\$ _____	\$ _____	

**END OF SECTION**

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**SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

## 1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost.
- B. Water Service: Pay water service use charges for water used by all entities for construction operations.
- C. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

## 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

## 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:
  - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.

2. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
3. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

### 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.



- G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
- H. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- I. Parking: Provide temporary parking areas for construction personnel.
- J. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- K. Project Identification and Temporary Signs: Provide Project identification sign. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
- L. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Cleaning" for progress cleaning requirements.
- M. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

### 3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  - 1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Site Enclosure Fence: Before construction operations, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
  - F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
    - 1. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
    - 2. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
- 3.4 OPERATION, TERMINATION, AND REMOVAL
- A. Maintenance: Maintain facilities in good operating condition until removal.
    - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  - B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION

**SECTION 01 60 00- PRODUCT REQUIREMENTS**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Work Included: This Section contains definitions, product requirements and requirements for prior approved items.
- B. Delivery and storage of materials and equipment.
- C. Procedures for selecting products and approving substitutions.

## 1.2 DEFINITIONS

- A. General: Definitions are not intended to negate the meaning of other terms used in Contract Documents, including specialties, systems, structure, finishes, accessories, furnishings, special construction, and similar terms, which are self-explanatory and have recognized meanings in the construction industry.
- B. Products: Purchased items for incorporation into the Work, regardless of whether specifically purchased for Project or taken from Contractor's stock of previously purchased products.
- C. Materials: Products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of Work.
- D. Appliances, Equipment, and Fixtures: Products with operational parts, regardless of whether motorized or manually operated and particularly including products with service connections (wiring, piping, etc.).
- E. System: A unit of Work (i.e., structural system, vacuum system, etc.) shown or specified to include particular products, materials, appliances, equipment, or fixtures.
- F. Substitutions: Where products, materials, appliances, equipment, or fixtures are listed by trade name(s), manufacturer name(s), or catalog reference(s) or where these items are shown or specified as part of a system or systems, items or systems proposed for use by Contractor that are not listed or differ from those shown or specified as part of a system will be considered substitutions.
  - 1. Submit substitutions in accordance with requirements of this Section.
  - 2. The requirements for substitutions do not apply to specified Contractor options. Revisions to Contract Documents, where requested by Owner or Architect are changes, not substitutions.
  - 3. Contractor's determinations of and compliance with governing regulations and orders issued by governing authorities do not constitute

substitutions, and do not constitute a basis for change orders; except as provided for under substitution procedures in this Section or elsewhere in Contract Documents.

- G. Prior -to-Bid Approvals: Products, materials, appliances, equipment, fixtures, or systems that have been proposed as substitutions and accepted by Owner prior to bid.

### 1.3 DESCRIPTION

- A. General: Specific products, materials, appliances, equipment, fixtures, accessories, manufacturers, and proprietary mentioned by name, grade, or brand, in Specifications or on Drawings have been selected for their particular fitness, availability, and desirability for use appropriate to Work of this Project and are intended to establish the standard of quality.
- B. Compliance: The compliance requirements, for individual products are multiple in nature and may include generic, descriptive, proprietary, performance, prescriptive, compliance with standards, compliance with codes, conformance with graphic details, and other similar forms and methods of indicating requirements.

### 1.4 PRODUCT REQUIREMENTS

- A. General: Provide products which comply with requirements, and which are undamaged and unused at time of installation, and which are complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for intended use.
  - 1. Materials shall be new unless otherwise specified and unused, except for testing of current production models on date of order, undamaged, and un-deteriorated at time of use.
  - 2. Identify materials in accordance with accepted trade standards and requirements of this Section.
  - 3. Select and use methods or processes, including intermediate processes, which will produce the specified finished material or product.
  - 4. Ascertain that the Work, including materials, products, and equipment delivered and installed, is in full compliance with the Contract Documents and appropriate submittals.
  - 5. Standard Products: Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar applications.
  - 6. Continued Availability: Where additional amounts of product, by nature of its application, are likely to be needed by Owner at a later date for maintenance and repair or replacement work, provide a standard, domestically produced product which is likely to be available to Owner at

such later date.

- B. Nameplates: Except as otherwise indicated for required approval labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on exterior of the Work.
  - 1. Labels: Locate required labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.
  - 2. Equipment Nameplates: Provide permanent nameplate on each item of service-connected or power-operated equipment. See sections specifying equipment requirements for specifics.

### 1.5 QUALITY ASSURANCE

- A. Special Requirement: Due to certain Owner requirements, Owner will not consider substitutions on certain items. Therefore, substitutions will not be considered for items followed by the words: "no substitution(s)."
- B. Architect's Compensation:
  - 1. Except as limited by provisions of Owner-Architect or Owner-Contractor Agreements, Contractor shall reimburse Owner for compensation paid to Architect for evaluation of substitution proposals made during construction, whether or not substitution is accepted by Owner.
  - 2. Refer to Request for Substitution form at the end of this Section.
- C. Delays and Costs:
  - 1. Substitution proposals made during construction shall be in accordance with procedures outlined in this Section, and be made in sufficient time to allow for adequate time for Architect's review and evaluation.
  - 2. Delays and added costs associated with inadequate supportive data, necessary extended evaluations, or redesign work caused by substitutions shall be borne by Contractor.
  - 3. Cost changes resulting from proposed substitutions shall be clearly stated with the initial substitution proposal. Subsequently discovered costs resulting from the substitution shall be borne by Contractor.

### 1.6 TRANSPORTATION AND HANDLING

- A. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.
- B. Provide equipment and personnel to handle products by methods to prevent

soiling or damage.

- C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- D. Deliver products in the manufacturer's sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.

#### 1.7 STORAGE AND PROTECTION

- A. Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible.
- B. Store sensitive products in weathertight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- D. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- E. Arrange storage to provide access for inspection, periodically inspect to assure products are undamaged and are maintained under required conditions.
- F. After installation, provide covering to protect products from damage from traffic and construction operations, remove when no longer needed.

#### 1.8 PROCEDURES

- A. Procedures for Selecting Products: Contractor's options for selecting products are limited by Contract Document requirements and governing regulations, and are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects.
  - 1. Single Product/Manufacturer Name:
    - a. Provide product indicated. Do not offer to provide an unnamed product unless it has been accepted under substitution provisions listed below.
    - b. Except as otherwise indicated, "Named" is defined to mean manufacturer's name for product as recorded in latest issue of published product literature as of date of Contract Documents.
    - c. Refer to requests to use products of a later (or earlier) model to Architect for acceptance before proceeding.

2. Two or More Product/Manufacturer Names:
  - a. Provide 1 of the named products, at Contractor's option.
  - b. Do not offer to provide an unnamed product unless it has been accepted under substitution provisions listed below.
3. Performance Requirements:
  - a. Provide products which comply with specific performances indicated and which are recommended by manufacturer (in published product literature or by individual certification) for application indicated.
  - b. Overall performance of a product is implied where product is specified for specific performances.
4. Standards, Codes, and Regulations: Where compliance with an imposed standard, code, or regulation is required, selection from among products which comply with requirements of those standards, codes, and regulations is Contractor's option.
5. Prescriptive Requirements: Provide products which have been produced in accordance with prescriptive requirements, using specified ingredients and components, and complying with specified requirements for mixing, fabricating, curing, finishing, testing, and similar operations in manufacturing process.
6. Visual Matching:
  - a. Where matching of an established sample is required, final judgment of whether a product proposed by Contractor matches sample satisfactorily is Architect's judgment.
  - b. Where no product exists within specified cost category, which matches sample satisfactorily and complies with requirements, comply with provisions concerning, substitutions and change orders for selection of an equivalent product.
7. Visual Selection:
  - a. Where specified product requirements include "color(s), pattern(s), texture(s), etc. selected by Architect" or words of similar effect, selection of manufacturer and basic product (complying with requirements) is Contractor's option, and subsequent selection of color(s), pattern(s), and texture(s), etc. is Architect's selection.
  - b. Where specified product requirements include "color(s), pattern(s), texture(s), etc., to match Architect's sample" or words to that effect, selection of product (complying with requirements, and within established cost category) is Architect's selection, including designation of manufacturer where necessary to obtain desired

color, pattern, or texture.

## 1.9 SUBSTITUTION PROCEDURES

- A. Prior (-to-Bid) Approvals: Substitute products, materials, appliances, equipment, fixtures, or systems will be considered by Architect.
1. Any bidder, material supplier, or manufacturer desiring to propose substitution(s) shall:
    - a. Submit in a sealed envelope catalog cuts, shop drawings, or other descriptive literature for products, materials, appliances, equipment, fixtures, or systems for proposed substitution.
    - b. Submit not later than 14 calendar days before bid opening
  1. Make request to Architect in triplicate on copies of Request for Substitution form included at end of this Section.
  2. Submittal(s) shall include a complete and adequate analysis showing point-for-point comparison to specified item(s) or system(s) and must prove equality or superiority.
  3. Include related Section and Drawing number(s), and fully document compliance with requirements for substitutions.
  4. Include product data/drawings, description of methods, samples.
    - a. Where applicable, statement of effect on construction time and coordination with other affected Work.
    - b. Cost information for proposal.
  5. Include identification of previous use locally with dates and names of Architect and Owner.
  6. Anything less will not be considered.
  7. Equivalency:
    - a. The Architect will be the initial judge of equivalency of proposed substitution(s).
    - b. Architect will make written recommendation of acceptance or rejection to Owner.
  8. Satisfaction:
    - a. Prior to proposing substitution(s), certify that item or system is equal to that specified.



- b. That it will fit into space allocated.
  - c. That item affords comparable ease of operation, maintenance, and service.
  - d. That appearance, longevity, and suitability for climate and use are comparable to item specified.
  - e. That substitution is in Owner's interest.
9. Manufacturer's data which is readily available to Architect is not acceptable for establishing proof of quality.
- a. Provide laboratory test data performed by a nationally recognized independent testing laboratory known for its testing expertise.
  - b. Laboratory test shall include types of materials used in substitute item or system, including their thickness and strength, and a direct comparison to item or system specified for capacities, capabilities, coatings, functions, life cycle usage, and operations.
  - c. No change in Architect's design intent will be allowed where item or system will be exposed and where it will be used.
10. Proof: Burden of proof that a proposed substitution is equal or equivalent to a specified item or system shall be upon Contractor, who shall support his request with sufficient test data, samples, brochures, and other means to permit Architect to make a fair and equitable decision on merits of proposal.
11. Based on Architect's written recommendation of acceptance or rejection, Owner will determine acceptability of proposed substitutions.
12. Architect will notify Bidders of Owner's acceptance not later than 5 calendar days prior to bid opening via an addendum to the Contract Documents listing only accepted substitutions.
13. Responsibility: Acceptance of substitutions shall not relieve Contractor from responsibility for complying with all other requirements of the Contract Documents and coordinating substitution(s) with adjacent materials and other affected equipment.
- B. During Construction:
1. Substitutions will not be considered when they are indicated or implied on submittals without separate written request prior to submittal, or when acceptance will require substantial revision of Contract Documents.
  2. Architect and Owner will consider requests from Contractor during construction for substitutions (following procedures outlined above for prior approvals) only under 1 or more of the following conditions:

- a. Substitution is required for compliance with subsequent interpretation of code requirements or insurance regulations.
- b. Shown or specified item or system cannot be provided within Contract Time or becomes unavailable due to no fault of Contractor.
- c. Subsequent information disclosed inability of item(s) or system(s) to perform properly or to fit in designated space, or manufacturer(s) refuse(s) to certify or warrant performance as required.
- d. When, in Architect's judgment, a substitution would be substantially in Owner's best interests in terms of cost (substantial credit), time, or other valuable considerations, after deducting offsetting responsibilities Owner may be required to bear, including additional compensation to Architect for evaluation and redesign services, increased cost of other work by Owner or separate contractors, and similar considerations.

PART 2 - PRODUCTS  
Not used.

PART 3 - EXECUTION  
Not used.

END OF SECTION

REQUEST FOR SUBSTITUTION

- A. Completed reproduction of this form shall accompany all requests for substitutions. Failure to submit form with request shall be cause for rejection. Substituted items or systems may be incorporated into the Work only after receipt of Owner's written approval. Fill in all applicable spaces and cross out all nonapplicable information bracketed ([]) or unbracketed.

[Subcontractor:] [Material Supplier:] [Manufacturer:] Date:  
 Requested Substitution:  
 Reference: Specification Section \_\_\_\_\_ Drawing Reference \_\_\_\_\_  
 Reason for Substitution: [Prior Approval] [During Construction]:

- B. Resulting Change to Contract Amount: [Add] [Deduct] \_\_\_\_\_  
 (Include supporting documentation.)

- C. For substitutions made during construction the Architect will, upon receipt of substitution proposal, fill in the following compensation information, add it to or deduct it from the Change to the Contract Amount and submit Net Change to Contract Amount to Owner for approval. Upon receipt of Owner's approval, Architect will proceed with substitution review.

D. Architect's Fee for Substitution Evaluation: \_\_\_\_\_

E. Architect's Fee for Changes to Contract: \_\_\_\_\_

- F. Documents Due to Substitution:  
 Net Change to Contract Amount (B + C + D): [Add] [Deduct]  
 Resulting Change to Contract Time: Add \_\_\_\_\_ Deduct \_\_\_\_\_  
 Summary of Related Work Requiring Coordination (if any):

(Contractor shall assume responsibility for complete coordination with Work of all trades involved if Substitution Request is approved.)

- G. Attached Documentation: The following is herewith attached to provide complete documentation of requested substitution:

[ ] Product Data [ ] Samples [ ] Shop Drawings  
 [ ] Test Reports [ ] Other:

- H. Contractor's Signature

Subcontractor's/Supplier's/Manufacturer's  
 Signature

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**SECTION 01 76 00- GUARANTIES AND WARRANTIES**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes requirements for guaranties and warranties for contract closeout and during specified guaranty/warranty periods.

## 1.2 DESCRIPTION OF REQUIREMENTS

- A. General Limitations: It is recognized that specific guaranties and warranties are intended to protect Owner against failure of the Work to perform as required, and against deficient, defective, and faulty materials and workmanship, regardless of sources.
- B. Related Damages and Losses: When correcting guaranteed or warranted work which has failed, remove and replace other Work of Project which has been damaged as a result of such failure or which must be removed and replaced to provide access for correction of Work.
- C. Reinstatement of Guaranty or Warranty Period: In addition to requirements in the General Conditions, when Work covered by a special project guaranty or product warranty has failed and has been corrected by replacement or restoration, reinstate guaranty or warranty by written endorsement for 1 year starting on date of acceptance of replaced or restored Work.
- D. Replacement Cost, Obligations: Except as otherwise indicated, cost of replacing or restoring failing guaranties or warranted units or products is Contractor's obligation, without regard for whether Owner has already benefitted from use through a portion of anticipated useful service lives.
- E. Rejection of Warranties: Owner reserves the right, at time of Substantial Completion or thereafter, to reject coincidental product warranties submitted by Contractor, which in opinion of Owner detract from or confuse interpretation of requirements of Contract Documents.
- F. Contractor's Procurement Obligations: Do not purchase, subcontract for, or allow others to purchase or subcontract for materials or units of Work for Project where a special project guaranty, specified product warranty, certification, or similar commitment is required until it has been determined that entities required to sign or countersign such commitments are willing to do so.
- G. Specific Guaranty or Warranty Forms: Where a special project guaranty or specified project warranty is required, prepare a written document to contain terms and appropriate identification; ready for execution by required parties.
  - 1. A sample form is attached as the last article of this Section.
  - 2. Refer to individual sections of Divisions 2 through 33 for specific content and requirements.

3. Submit draft to Owner for approval prior to final executions.

### 1.3 REQUIREMENTS INCLUDED

- A. Compile specified warranties.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when so specified.
- D. Review submittals to verify compliance with Contract Documents.
- E. Submit to Architect for review and transmittal to Owner.

### 1.4 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds, and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: 2 each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete index information for each item.
  1. Product or work item with index number to bound item.
  2. Firm, with name of principal, address, and telephone number.
  3. Scope.
  4. Date of beginning of warranty, bond or service and maintenance contract.
  5. Duration of warranty, bond, or service maintenance contract.
  6. Provide information for Owner's personnel:
    - a. Procedure to be followed in case of failure.
    - b. Circumstances which might affect the validity of warranty or bond.
  7. Contractor, name of responsible principal, address and telephone number.

### 1.5 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:

1. Size 8-1/2 x 11 inches on punched sheets for standard 3-ring binder.
    - a. Fold larger sheets to fit into binders.
  2. Warranty-Guaranty wording shall be as printed below.
  3. Cover: Identify each packet with typed or printed title "GUARANTIES AND WARRANTIES". List:
    - a. Title of Project.
    - b. Name of Contractor.
- C. Binders: Commercial quality, 3-ring, with durable and cleanable plastic covers.

#### 1.6 TIME OF SUBMITTALS

- A. Make submittals within 10 days after date of Substantial Completion prior to final request for payment.
- B. For items or work, where acceptance is delayed materially beyond Date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

#### 1.7 SUBMITTALS REQUIRED

- A. Submit warranties, bonds, service and maintenance contracts as specified in respective Sections of Specifications and as follows:
  1. Provide when noted in individual Sections of the Project Manual Divisions 2 through 33.

#### 1.8 SAMPLE FORM OF WARRANTY-GUARANTY

- A. Print or type Warranty-Guaranty on installing contractor's own letterhead.
- B. Wording and signatures required.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

Not used.

A. GUARANTEE-WARRANTY

When required by the specifications, warranties and/or guarantees other than one year shall be in the form of the following on the Contractor's own letterhead:

"GUARANTEE-WARRANTY FOR INTERMOUNTAIN HEALTHCARE, **Logan Regional Hospital Reconfiguration - Sleep Lab** project.

We hereby warrant and the General Contractor and/or Material Manufacturer guarantee that the (name of product, equipment or system) that we have installed in the **Logan Regional Hospital Reconfiguration - Sleep Lab** project, has been done in accordance with the Contract Documents and that the work as installed will fulfill the requirements of the guaranty-warranty included in the specifications. We agree to repair or replace any or all of our work, together with any other adjacent work which may be displaced by so doing, that may prove to be defective in its workmanship or material within a period of \_\_\_\_\_ years from the date of Substantial Completion, without any expense whatsoever to the Owner, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of our failure to comply with the above mentioned conditions within sixty (60) days after being notified in writing by the Owner, we collectively or separately do hereby authorize the Owner to proceed to have said defects repaired and made good at our expense, and we will honor and pay the costs and charges therefore upon demand.

Signed \_\_\_\_\_ Countersigned \_\_\_\_\_  
(Subcontractor) (General Contractor)

Name \_\_\_\_\_ Name \_\_\_\_\_  
(Print) (Print)

Company \_\_\_\_\_ Company \_\_\_\_\_

Address \_\_\_\_\_ Address \_\_\_\_\_

\_\_\_\_\_

License No. \_\_\_\_\_ License No. \_\_\_\_\_

Countersigned \_\_\_\_\_  
(Material Manufacturer)

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

END OF SECTION



**SECTION 01 78 23 – OPERATION AND MAINTENANCE DATA**

## PART 1 - GENERAL

## PART 2 - RELATED DOCUMENTS

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

## 2.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Maintenance manuals for the care and maintenance of products, materials, and finishes.
- B. Related Sections include the following:
  - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
  - 3. Divisions 2 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

## 2.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

## 2.4 SUBMITTALS

- A. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
  - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

## 2.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

## PART 3 - OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
  - 1. List of documents.
  - 2. List of systems.
  - 3. List of equipment.
  - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

## 3.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name, address, and telephone number of Contractor.
  - 6. Cross-reference to related systems in other operation and maintenance manuals.

- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders/Maintenance Manuals: Organize operation and maintenance data into suitable sets of manageable size. Binders shall be Red Buckram binders with easy view metal for sheet size 11" X 8 ½" with expandable metal capacity as required for the project, rivet through construction with library corners using #12 BB and lining with same materials as cover, front cover and back-bone foil stamped in white. Binders shall be as manufactured by Hiller Bookbinding or equal. The master index sheet and each tabbed index sheet shall be AICO Gold-Line indexes or equal. Mark appropriate identification on front spine of each binder. Include the following types of information:
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
  2. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
  3. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

### 3.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.

- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

### 3.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions.
  2. Performance and design criteria if Contractor is delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.

- C. Operating Procedures: Include the following, as applicable:
  - 1. Startup procedures.
  - 2. Equipment or system break-in procedures.
  - 3. Routine and normal operating instructions.
  - 4. Regulation and control procedures.
  - 5. Instructions on stopping.
  - 6. Normal shutdown instructions.
  - 7. Seasonal and weekend operating instructions.
  - 8. Required sequences for electric or electronic systems.
  - 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

### 3.5 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

### 3.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  1. Standard printed maintenance instructions and bulletins.
  2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  3. Identification and nomenclature of parts and components.
  4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  1. Test and inspection instructions.
  2. Troubleshooting guide.
  3. Precautions against improper maintenance.
  4. Aligning, adjusting, and checking instructions.
  5. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  1. Include procedures to follow and required notifications for warranty claims.

## EXECUTION

## 3.7 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
  - 2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."
- F. Comply with Division 1 Sections for schedule for submitting operation and maintenance documentation.

END OF SECTION

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**SECTION 01 78 39 – PROJECT RECORD DOCUMENTS**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
- B. Related Sections include the following:
  - 1. Division 1 Section for general closeout procedures.
  - 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Divisions 2 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

## 1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up Record Prints.
    - a. Final Submittal: Submit one set(s) of marked-up Record Prints showing modifications for trades involved in the project.
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one copy of each Product Data submittal.
  - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

## PART 2 - PRODUCTS

## 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an understandable drawing technique.
    - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made following Architect's written orders.
    - k. Details not on the original Contract Drawings.
    - l. Field records for variable and concealed conditions.
  3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

## 2.3 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION

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**SECTION 01 79 00- CLEANING**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Work Included: Requirements for periodic, general, and final cleaning of the project.
- B. Provide temporary and periodic clean-up of extra materials, waste and general debris during construction of the work, together with the final clean-up and cleaning, polishing and other "housekeeping" required to bring various surfaces to an acceptable condition prior to final inspection, or before additional work is done during construction.
- C. This Section includes requirements for Cleaning for all phases of the Project. Some requirements of this Section may not be applicable to individual project Phases.

## 1.2 GENERAL REQUIREMENTS

- A. Maintain premises and public properties free from accumulations of waste, debris, and rubbish in accordance with applicable safety and insurance standards and local ordinances.
- B. The acceptable level of cleanliness of the Project shall be the decision of the Architect.
  - 1. Work necessary to achieve such acceptable state shall be performed when required.
- C. Burning: Burning of waste materials and/or rubbish on Site is not permitted.

## 1.3 CLEAN-UP DURING CONSTRUCTION

- A. During construction, provide cleaning-up as follows:
  - 1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
  - 2. Remove debris and rubbish from pipe chases, plenums, down spouts, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
  - 3. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
  - 4. Remove waste materials, debris, and rubbish from site weekly, or more often if needed, and dispose off-site in compliance with local regulations.

5. Storage areas: Ensure that materials to be used for construction are stored in designated structures or areas by the appropriate trades. Maintain such areas or structures in a clean condition for the life of the Project.
6. Containers: Provide appropriate containers, such as dump containers, and locate on site for collection of waste materials and rubbish.
7. Supervision: Oversee all cleaning of areas by the trades using them. Ensure that resulting accumulations are deposited in appropriate containers.
8. Clean-up: Daily, weekly, or as necessary, clean-up floors and Site areas. Remove all loose materials, by sweeping if necessary.

#### 1.4 FINAL CLEANING

- A. Provide final clean-up and polishing just prior to final inspection and/or acceptance of the work of the Project.
- B. Preparation:
  1. Prior to final inspection, remove all loose material of any nature, except spare parts, loose furniture or furnishings, manuals, parts books, and similar items.
  2. Remove all temporary buildings, utility lines or pipes and other work of a temporary nature.
  3. Remove all temporary wrappings. Leave no trace of wrap or adhesive.
- C. Surface Cleaning:
  1. Special cleaning for specific units of Work as specified and as shown on Drawings.
  2. Provide final cleaning of the Work, at time indicated, consisting of cleaning each surface or unit of Work to normal "clean" condition expected for a first-class building cleaning and maintenance program.
  3. Comply with manufacturer's instructions for cleaning operations.
- D. The following are examples, but not by way of limitation, of cleaning levels required:
  1. Remove labels which are not required as permanent labels.
  2. Clean transparent materials, including mirrors and window/door glass, to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace broken glass and damaged transparent materials.

3. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of dust, stains, films, and similar noticeable distracting substances.
    - a. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces.
    - b. Restore reflective surfaces to original reflective condition.
  4. Wipe surfaces of mechanical and electrical equipment clean, including elevator equipment and similar equipment; remove excess lubrication and other substances.
  5. Remove debris and surface dust from limited-access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  6. Clean concrete floors in unoccupied spaces broom clean.
  7. Vacuum clean carpeted surfaces and similar soft surfaces.
  8. Clean plumbing fixtures to a sanitary condition, free of stains including those resulting from water exposure.
  9. Clean light fixtures and lamps so as to function with full efficiency.
  10. Clean Project Site (staging areas, Contractor Parking areas), including landscape development areas, of litter and foreign substances.
  11. Sweep paved areas to a broom-clean condition; remove stains, petro-chemical spills, and other foreign deposits.
- E. Pest Control: Engage an experienced exterminator to make a final inspection of Project, and to rid Project of rodents, insects, and other pests.
- F. Removal of Protection: Except as otherwise indicated or requested by Hospital Representative, remove temporary protection devices and facilities which were installed during course of Work to protect previously completed Work during remainder of construction period.
- G. Compliances:
1. Comply with safety standards and governing regulations for cleaning operations.
  2. Do not burn waste materials at site, or bury debris or excess materials on the property, or discharge volatile or other harmful or dangerous materials into drainage systems.
  3. Remove waste materials from site and dispose of in a lawful manner.
- H. Moving Parts: Lubricate moving parts as recommended by the parts manufacturer, or as directed by the Architect. Wipe clean, all surplus

lubricants.

- I. Protection: Protect finished floors from damage due to traffic or other causes.

END OF SECTION



**SECTION 02 41 19 - SELECTIVE DEMOLITION**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Demolition and removal of selected portions of a building or structure.
  - 2. Repair procedures for selective demolition operations.

## 1.3 DEFINITIONS

- A. Remove: Carefully detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

## 1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

## 1.5 SUBMITTALS

- A. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

## 1.6 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
  - 1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. Owner assumes no responsibility for condition of areas to be selectively demolished.
  - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If materials suspected of containing hazardous materials are encountered in the work, Contractor will be responsible for removal and disposal of all materials. A copy of an Asbestos Report will be provided to the Contractor prior to construction beginning. See Bid Proposal for unit price to remove hazardous materials.
- E. Storage or sale of removed items or materials on-site will not be permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

#### PART 2 - PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION

##### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

##### 3.2 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.

1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.

- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

### 3.3 PREPARATION

- A. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

- B. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

### 3.4 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Dispose of demolished items and materials promptly.

- B. Existing Facilities: Comply with building manager's requirements for using and protecting building facilities during selective demolition operations.

### 3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

- B. Burning: Do not burn demolished materials.

- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

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**SECTION 05 05 00 – METAL FASTENERS**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Work Included: This Section establishes general standards and requirements for metal fasteners utilized for attachment of items to the primary structure of the building and is incorporated in others Sections of these specifications where referenced, including:
1. Expansion Bolts.
  2. Powder Actuated Devices.
  3. Bolts, screws and other fasteners.
- B. Work Specified Elsewhere:
1. Section 092216 – Non-Structural Metal Framing
  2. DIVISION 23 – Mechanical.
  3. DIVISION 26 – Electrical.

## 1.2 SUBMITTALS

- A. Comply with provisions of Section 013300 – Submittal Procedures.
- B. Product Data: Manufacturers' information on materials, fabrication, and installation. Include current ICBO Reports and other information to substantiate compliance with Contract Documents.
- C. Substitutions: Include with requests for substitution of fastening device type, minimum embedment, length, load capacity for pull out and shear, and installation torque of fasteners and statement that fastening devices meet or exceed requirements specified in Contract Documents.

## 1.3 QUALITY ASSURANCE

- A. Field Quality Control:
1. The Owner's Testing Lab will perform and report on tests and inspections as follows:
  2. Expansion Bolts:
    - a. Test 50 percent of drilled-in anchorages to 2.0 times the allowable load specified with special inspection in tension.
    - b. If any anchor fails testing, test all anchors of the same category installed that day until twenty consecutive anchors pass, then resume the initial testing frequency. Cost of this testing shall be

borne by Contractor.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Expansion Bolts: Hilti, Inc.'s Kwik Bolt II, Kwik Bolt III or equal; wedge type stud expansion anchor system, comply with FS FF-S-325, Group II, Type 4, Class 1. Provide stainless steel expansion bolts for exterior exposure.
- B. Powder Actuated Devices: Hilti Fastening Systems, Impex Tool Corporation, or equal; pins and tools. Tempered steel pins with special corrosion-resistant finish. Provide guide washers to accurately control penetration. Accomplish fastening by low-velocity piston-driven powder-actuated tool.
  - 1. Type and Size: Hilti X-DNI, dome head nail with smooth shank, 0.145-inch shank diameter, not less than 1-1/4-inch penetration.
- C. Sheet Metal Screws: John Wagner Associates' Grabber or equal: Unless otherwise noted on Drawings, type to suit stud, track, or channel gauge and as follows.
  - 1. Where Overlaid with Gypsum Board or Other Finish Material:
    - a. For Fastening to 20 Gauge and Lighter Material: No. 8 by 9/16-inch Wafer Head Streaker.
    - b. For Fastening to 18 Gauge and Heavier Material: No. 8 by 1/2-inch Wafer Head Self-Drilling.
  - 2. Where Not Overlaid with Finish Material:
    - a. For Fastening to 20 Gauge and Lighter Material: No. 8 by 9/16-inch Hex Head Streaker.
    - b. For Fastening to 18 Gauge and Heavier Material: No. 8 by 1/2-inch Hex Head Self-Drilling.
- D. Nuts and Bolts: ASTM A307 with suitable nuts, in accordance with ASTM A563, and washers 1/4-inch diameter, unless otherwise noted.
- E. U-Bolts: Special sizes and shapes shown; material as specified for nuts and bolts.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Expansion Bolts: Install in predrilled holes for fastening items into concrete.
  - 1. Install expansion bolts according to the manufacturer's instructions as to tools, torque and tightening procedure.

2. Expansion bolt locations and spacings: As shown.
  3. Edge Distance: Not less than 10 bolt diameters.
  4. Unless otherwise noted, install expansion bolts with manufacturer's recommended minimum embedments. Embedment length is exclusive of thickness of floor coverings, grout pads or other overlays.
  5. Do not recess expansion bolts more than one-fourth of the nominal bolt diameter. Abandon overdrilled holes or partially fill with nonshrink grout and redrill when grout has set.
  6. Abandon holes if the axis of a drilled hole deviates more than 5 degrees from normal to the concrete surface.
  7. If a concrete reinforcing bar is encountered during drilling, immediately terminate drilling and notify the Architect. Subject to review and approval the SEOR, the Architect may authorize using one of the following procedures:
    - a. If the location may be shifted, fill abandoned hole with non-shrink grout and install expansion bolt with a minimum of 1/2 inch of sound concrete between the expansion bolt and the abandoned hole, or...
    - b. If the location may not be shifted, use a diamond core drill to cut the rebar and drill the hole beyond the reinforcing such that the whole wedge portion of the expansion bolt can be expanded below the bar, or...
    - c. If the location may not be shifted, core an oversize hole at the direction of the Architect and grout an acceptable anchor in place.
- B. Fasten Work tightly to prevent rattle or vibration except where expansion-contraction tolerances are required.
- C. When expansion bolts are installed through metal deck into concrete slab above, embedment shall not extend closer than 3/4-inch to top of concrete. Locate at center of bottom flute. Minimum embedment shall be 1-1/2-inches above top flute of decking.
- D. Expansion Bolt Test Values:
1. Test Procedure: Apply proof test loads by means of hydraulic ram, calibrating spring loading device, or torque wrench without removing nut if possible. If not possible, remove nut and install a threaded coupler to same tightness as original nut using a torque wrench.
  2. Test Equipment: Calibrated by approved testing laboratory per standard industry procedures.

3. Expansion Bolts shall withstand following minimum test loads for specified wedge type anchors:

<u>Anchor Thread Size</u> (diameter in inches)	<u>Tension Test Load</u> (lbs.)	<u>Test Torque</u> ft-lbs.)
1/4	800	10
3/8	1100	25
1/2	2000	50
5/8	2300	80
3/4	3700	150
1	5800	250

4. Acceptance Criteria:
- Hydraulic Ram Method: Expansion bolt is acceptable if there is no observable movement nor loosening of washer at application of tension test load.
  - Torque Wrench Method: Expansion bolt is acceptable if the test torque is reached within one-half turn of the nut.
5. Test Timing: Within 24 hours after expansion bolt installation and in the presence of the Inspector of Record.

END OF SECTION



**SECTION 05 50 10 – MISCELLANEOUS METAL FABRICATIONS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Furnish labor, materials, tools, equipment, and services for Miscellaneous Metal Fabrications, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

**1.2 QUALITY ASSURANCE**

- A. ASTM International:
  - 1. ASTM A27 Standard Specification for Steel Castings, Carbon, for General Application
  - 2. ASTM A36 Standard Specification for Carbon Structural Steel
  - 3. ASTM A47 Standard Specification for Ferritic Malleable Iron Castings
  - 4. ASTM A48 Standard Specification for Gray Iron Castings
  - 5. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
  - 6. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 7. ASTM A148 Standard Specification for Steel Castings, High Strength, for Structural Purposes
  - 8. ASTM A197 Standard Specification for Cupola Malleable Iron
  - 9. ASTM A276 Standard Specification for Stainless Steel Bars and Shapes
  - 10. ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
  - 11. ASTM A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
  - 12. ASTM A354 Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
  - 13. ASTM A480 Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
  - 14. ASTM A484 Standard Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings
  - 15. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 16. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
  - 17. ASTM A668 Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use
  - 18. ASTM A992 Standard Specification for Structural Steel Shapes
  - 19. ASTM B26 Standard Specification for Aluminum-Alloy Sand Castings
  - 20. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - 21. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
  - 22. ASTM B308 Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
- B. American Society of Mechanical Engineers (ASME):

1. ANSI/ASME-A17.1 Handbook on Safety Code for Elevators and Escalators
- C. American Institute of Steel Construction (AISC)
  1. Steel Construction Manual
- D. American Iron and Steel Institute (AISI):
  1. Specification for the Design of Cold-Formed Steel Structural Members.
- E. American Welding Society (AWS):
  1. ANSI/AWS C1.1M/C1.1 Recommended Practices for Resistance Welding
  2. ANSI/AWS D1.1 Structural Welding Code - Steel.
  3. ANSI/AWS D1.3 Structural Welding Code - Sheet Steel.
- F. National Association of Architectural Metals Manufacturers (NAAMM):
  1. Class 1, Architectural, per NAAMM AMP-555, Code of Standard Practice for the Architectural Industry.

### 1.3 SUBMITTALS

- A. Shop Drawings:
  1. Plans and elevations showing members and connections.
  2. Anchors and accessory items.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Materials Listed:
  1. Base: As noted.
- B. Galvanizing Repair Paint:
  1. Base:
    - a. Tnemec.
  2. Optional:
    - a. ZRC Worldwide.
    - b. Sherwin-Williams.
- C. Shop Primer:
  1. Base:
    - a. As recommended by finish coat manufacturer for substrate.
  2. Optional:
    - a. Sherwin-Williams.
    - b. Tnemec.
- D. Non-shrink Grout:
  1. Base:
    - a. Dayton Superior Corporation.
  2. Optional:
    - a. Sauereisen.
    - b. CGM Building Products.
- E. Decorative Bollard Covers:
  1. Base:
    - a. Innoplast
- F. Other manufacturers desiring approval comply with Section 00 26 00.

## 2.2 MATERIALS

- A. Structural Steel:
  - 1. Steel, Structural W shapes and tee's: ASTM A992, 50KSI yield point.
  - 2. Other steel shapes and plate: ASTM A36.
  - 3. Pipe – Round ASTM A53 Grade B.
  - 4. Tubing square or rectangular: ASTM A500, grade-B, 46KSI minimum.
- B. Cast Steel:
  - 1. ASTM A27, Grade-65-35; and ASTM A148, Grade-80-50.
- C. Steel Forgings:
  - 1. ASTM A668.
- D. Bolts:
  - 1. ASTM A307, ASTM A325, ASTM A354.
- E. Filler Metal:
  - 1. AWS Standards.
- F. Cast Iron:
  - 1. ASTM A48, Class 30, minimum 30,000 PSI tensile.
- G. Malleable Iron:
  - 1. ASTM A47 and ASTM A197.
- H. Aluminum:
  - 1. ASTM B308 for particular alloy in standard shapes and extrusions.
  - 2. ASTM B26 for castings.
- I. Stainless Steel:
  - 1. ASTM A484 and ASTM A276.
  - 2. Concealed: Type 302 or Type 304.
  - 3. Exposed: Type 304.
    - a. Finish: ASTM A480 AISI finish #4, unless otherwise indicated.
  - 4. Exposed: Type 316.
    - a. Finish: ASTM A480 AISI finish #4, unless otherwise indicated.
- J. Masonry Anchorage Devices:
  - 1. Standard manufactured items.
  - 2. Lead expansion shields for machine screws and bolts 1/4 IN and smaller: Head out embedded nut type.
  - 3. For machine screws and bolts larger than 1/4 IN: Manufacturers' standard.
  - 4. Bolt anchor expansion shields for lag bolts: Zinc alloy, long shield anchors.
  - 5. Bolt anchor expansion shields for bolts: Closed end bottom bearing type.
  - 6. Anchor to embed or set device in setting compound or epoxy grout where shown.
- K. Fasteners:
  - 1. Galvanized or stainless where built into exterior walls.
  - 2. Select fasteners for type, grade and class required.
  - 3. Bolts and Nuts: Regular hexagon head ASTM A307, Grade-A.
  - 4. Lag Bolts: Square or octagonal head type.
  - 5. Machine Screws: Cadmium plated steel.
  - 6. Wood Screws: Flat head carbon steel.
  - 7. Plain Washers: Round, carbon steel.
  - 8. Lock Washers: Helical spring carbon steel.
- L. Non-shrink Grout:

1. Compressive strength: 9000 PSI at 7 days.
  2. Base Product: 1107 Advantage Grout by Dayton Superior.
- M. Abrasive Warning Tape:
1. Self-adhering, tape with slip resistive mineral surface.
  2. Color: Safety Yellow.
  3. Width: 2 IN, except where noted otherwise.
  4. Tape Type 2:
    - a. Base Product: Safety-Walk 530 Conformable by 3M.
    - b. Backing: Aluminum foil.
    - c. Thickness: 0.035 IN.
    - d. Use Type 2 at top and bottom rungs of ladders.

### 2.3 FABRICATION

- A. Form to shapes indicated with straight lines, sharp angles, and smooth curves.
- B. Shop fabricate in as large assemblies as practicable.
- C. Anchorage Accessories:
  1. Items required securing wood to metal, wood to masonry, metals to masonry or concrete, metal to metal or metal to other items.
- D. Drill or punch holes with smooth edges for temporary field connections and attachment of work by other trades.
  1. Conceal fastenings where practicable.
- E. Make permanent shop and field connections with continuous fillet type welds.
  1. Grind exposed welds smooth.
- F. Supply items required to complete construction and installation.
- G. Meet requirements specified under Structural Steel for fabricating items of structural nature or use.

### 2.4 FINISHES

- A. Items not to receive coatings:
  1. Surfaces scheduled to be fireproofed with spray-on material.
  2. Machined surfaces.
  3. Surfaces adjacent to field welds.
  4. Contact surfaces of bolt connections at slip connections.
  5. Top flanges of beams to receive shear connectors.
  6. Items for which no coating or field finish is specified.
- B. Shop Primer for Interior Non-wet Items:
  1. Primer: Coordinate with field applied finish systems specified in Section 09 91 23.
  2. Apply primer for interior finish paint to following surfaces not receiving other coating:
    - a. Surfaces exposed on interior.
  3. Clean thoroughly before priming; remove mill scale, rust, dirt, oil, and grease in accordance with SSPC-SP3.
  4. Apply in accordance with paint manufacturer's instructions.
    - a. Apply minimum 0.002 IN, dry film thickness.
- C. Hot-dip Galvanized (HDG) Coating for Exterior Items:
  1. Galvanize (HDG) the following items:
    - a. Items to be installed on site, roof or other areas that are outside of building enclosure walls. This shall include items attached to exterior walls of building.

- b. Items to be installed in wet or humid (>70 percent RH) areas of building.
  - c. Partial listing of items to receive HDG:
    - 1) Masonry lintels, ledge angles and shelf angles.
    - 2) Pipe Bollards.
    - 3) Exterior Ladders, Stairs and railings.
    - 4) Exterior gratings and substructure.
    - 5) Similar items which are exposed to weather or built-in to Exterior walls.
    - 6) Other items indicated.
  - 2. Clean thoroughly before galvanizing.
  - 3. Galvanize in accordance with ASTM A123.
- D. Galvanizing Repair Coating:
- 1. Tnemec Series 94-H20 Hydro-Zinc.
  - 2. ZRC Worldwide, Galvilite 221.
  - 3. Sherwin Williams Zinc Clad III HS 100.
  - 4. Galvanizing repair coating shall have a VOC content no greater than 250 g/L.
- E. Finish Painting:
- 1. Exterior: See Section 09 91 13.
  - 2. Interior: See Section 09 91 23.

## 2.5 METAL FABRICATIONS

- A. Ladders:
- 1. Design to comply with the following regulations:
    - a. ANSI-A14.3.
    - b. OSHA 29 1910.27.
  - 2. Material:
    - a. Exterior Ladders: Galvanized steel, painted by Section 09 91 13.
    - b. Interior Ladders: Shop-primed steel, painted by Section 09 91 23.
  - 3. Side rail members: Minimum 1/2 x 2 IN.
  - 4. Rungs: Minimum 3/4 IN round or square bars.
  - 5. Punch rungs through side rails and weld.
  - 6. Size to support concentrated moving load of 200 LB.
  - 7. Minimum clearance from centerline of rung to wall or obstruction: 7 IN.
  - 8. Minimum ladder width: 16 IN between side rails.
  - 9. Rung spacing: 12 IN O.C.
  - 10. Apply abrasive warning tape Type 2 to top and bottom rung of ladders.
  - 11. Elevator pit ladders:
    - a. Comply with general items above, except as amended by following:
    - b. Extend from bottom of pit to 4 FT above floor level.
    - c. Rungs: Minimum 3/4 IN round or square bars.
    - d. Rung clearance: 7 IN from center of rung to face of pit wall.
    - e. Maximum projection from wall: 8 IN or as directed by locally adopted codes and elevator running clearances.
    - f. Comply with ANSI/ASME-A17.1.
    - g. Coordinate final dimensions and locations with Elevator contractor.
- B. Metal Gratings:
- 1. Complying with NAAMM Metal Bar Grating Manual.
  - 2. Material and thickness (except where otherwise indicated):
    - a. Galvanized steel, nominal 1-1/2 IN thick.
  - 3. Load capacity: Support minimum uniform load of 200 PSF.
  - 4. Provide hold down clips.
  - 5. Furnish with frames and support items of comparable material and finish.

- C. Steel Support Angles, Support Frames, and Loose Lintel Steel Members:
  - 1. ASTM A36 steel, Sizes and configurations as indicated.
  - 2. Items to be hot dip galvanized:
    - a. Items to be permanently exposed to weather, high-humidity, or wet conditions.
    - b. Items set into exterior walls.
  - 3. Shop Prime interior items (in non-wet areas).
- D. Miscellaneous Equipment Supports:
  - 1. ASTM A36 steel, Sizes and configurations as indicated.
  - 2. Examples of items included:
    - a. Supports for Folding Partitions, Operable Walls, Coiling Doors and Grilles.
    - b. Supports for ICU Doors.
    - c. Support of Medical Equipment including Surgical Lights, Power Columns. And other items indicated.
    - d. Ceiling hung toilet partitions.
    - e. Other miscellaneous support items as indicated.
  - 3. Items to be hot dipped galvanized:
    - a. Items to be permanently exposed to weather, high-humidity, or wet conditions.
    - b. Items set into exterior walls.
  - 4. Shop Prime interior items (in non-wet areas).
- E. Bollards:
  - 1. Provide where indicated.
  - 2. Supply items required to complete construction and installation.
  - 3. Minimum Workmanship Standards (unless noted otherwise): Class 1, Architectural, per NAAMM AMP-555, Code of Standard Practice for the Architectural Industry.
  - 4. Utility Bollards Type UB-1:
    - a. 6 IN diameter extra strength, HDG (galvanized), steel pipe.
    - b. Length: Unless otherwise indicated; minimum 42 IN projection above ground and 36 IN embedment into concrete.
    - c. Fabricate with welded on anchors.
    - d. Fill pipe with 3000 PSI concrete with rounded top.
    - e. Paint (in-field) by Division 09.
  - 5. Steel Bollards with Decorative Cover Type DB-1:
    - a. Assembly including a concrete-filled steel pipe with a decorative cover sleeve.
    - b. Steel pipe bollard:
      - 1) 6 IN diameter extra strength, hot dip galvanized steel pipe.
      - 2) Length: Unless otherwise indicated; minimum 42 IN projection above ground and 36 IN embedment into concrete.
      - 3) Fabricate with welded on anchors.
      - 4) Fill with 3000 PSI concrete, flush at top.
    - c. Decorative Bollard Covers:
      - 1) Description: 1/8 IN thick, HDPE.
      - 2) Size as appropriate for pipe.
      - 3) Color: To be selected by Architect.
        - a) Five year warranty for color-fastness, cracking and UV-resistance.
      - 4) Dual reflective stripes near top of cover.
      - 5) Base Product: Bollardgard by Innoplast.
- F. Slip-resistant Stair Nosings:
  - 1. For use on exterior concrete steps.
  - 2. Abrasive type with steel wing anchors and recessed screws to allow replacement of units:
  - 3. Space anchors not over 24 IN on center.

4. Minimum 3 anchors per nosing.
  5. Furnish units full width of treads.
  6. Base Product: XH 300 (modified) by Balco Inc.
  7. Optional:
    - a. Amstep Products/Div American Safety Tech.
    - b. Wooster Products; WP3T.
- G. Diamond plate wall protection at Material Management, where indicated:
1. 1/4 IN thick checker plate.

## **2.6 GAS AND LIQUID CYLINDER RESTRAINT ASSEMBLY**

- A. Cylinder Rack Assembly (Steel Tube Assembly):
1. Acceptable Manufacturers:
    - a. Safe-T-Rack Systems, Inc.
    - b. Spectra Gases, Inc.
    - c. Matheson Tri-Gas.
    - d. Air Liquide.
    - e. Other manufacturers desiring approval comply with Section 00 26 00.
    - f. Substitutions are not permitted.
  2. Frame members: 50mm 2 IN x 50mm 2 IN x 3mm 1/8 IN square steel tube.
  3. Construction:
    - a. All welded construction.
    - b. Weld cover plates to close exposed tube ends.
    - c. Grind and polish welds to produce smooth surface with no visible evidence of welding when painted.
    - d. Frame shall have welded chain link or similar hardware for attachment for each end of chain.
    - e. Finish:
      - 1) Powder coated factory finish.
      - 2) Color shall be selected by Architect.
  4. Retainer Rods:
    - a. Provide 6mm 1/4 IN diameter stainless steel retainer rods with turned down ends.
    - b. Drill 7mm 9/32 IN diameter holes in top rails to receive retaining rods.
  5. Chain and Associated Hardware:
    - a. Chain and hardware shall be Type 304 or Type 316 stainless steel.
    - b. Chain: 6mm 1/4 IN diameter, welded chain. Two chains per cylinder at high and low points.
    - c. Provide threaded connector chain link at each end and one harness clip at the one end: McMaster-Carr Supply Company, Suncor Stainless, Inc. Other manufacturers desiring approval comply with Section 00 26 00.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

- A. Verify suitability of substrate to accept installation.
- B. Installation constitutes acceptance of responsibility for performance.
- C. Verify wall backing has been installed for wall-mounted items specified in this Section.
  1. See Section 09 22 16.

### 3.2 INSTALLATION

#### A. General:

1. Set work level, true to line, plumb.
2. Weld field connections and grind smooth.
3. Where practical, conceal fastenings.
4. Secure metal to wood with lag screws of adequate size with appropriate washers.
5. Secure metal to concrete with embedded anchors, setting compounds, caulking and sleeves, or setting grout.
  - a. Use expansion bolts, toggle bolts, or screws for light duty service.
6. Meet structural requirements for erecting items of structural nature.
7. Do not field splice fabricated items unless size requires splicing.
8. Weld splices.
9. Provide fabricated items complete with attachment devices as required to install.

#### B. Galvanic Repair:

1. After galvanized units have been erected and anchored apply galvanizing repair paint in accordance with manufacturer's recommendations.
2. Surface preparation: Remove contaminates in accordance with SSPC SP-1.

#### C. Bollards:

1. Direct-buried:
  - a. Hole Depth: 6 IN deeper than embedment length specified for bollard.
  - b. Hole Diameter: 24 IN diameter for 6 IN diameter pipes.
  - c. Set pipe bollards plumb and to the exposure height indicated.
2. Surface-Bolted and other means of attachment: Install as detailed.
3. Fill annular space with concrete fill having a compressive strength of at least 3000 PSI.
4. Paint or cover with decorative sleeves as scheduled.

END OF SECTION 05 50 10



**SECTION 06 06 60 – TRANSLUCENT RESIN PANEL SYSTEM**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the Plastic Fabrication as shown and specified in the described system(s):
  - 1. Partitions
- B. Related Sections include the following:
  - 1. Section 06 06 60 Schedules for Plastic Fabrications;
  - 2. Section 10 22 00 Partitions

## 1.3 SUBMITTALS

- A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 33 00 "Submittal Procedures".
- B. Product Data: Submit manufacturer's product data; include product description, fabrication information, and compliance with specified performance requirements.
- C. Submit product test reports from a qualified independent 3<sup>rd</sup> party testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project.
  - 1. Test reports required are:
    - a. Rate of Burning (ASTM D 635)
    - b. Self-Ignition Temperature (ASTM D 1929)
    - c. Density of Smoke (ASTM D 2843)
    - d. Flame spread and Smoke developed testing (ASTM E 84)
    - e. Room Corner Burn Test (NFPA 286)
    - f. Extent of Burning (UL 94)
    - g. Impact strength (ASTM D 3763)
    - h. Safety glazing impact resistance (ANSI Z97.1-2004)
    - i. UPITT Test for Combustion Product Toxicity
    - j. Dynamic environmental testing (ASTM standards D 5116 and D 6670)
- D. Building Approvals: Plastic Fabrications are to have been evaluated and must be registered with and comply to requirements of the following jurisdictions:

1. New York Department of Buildings (Product must have an MEA [Materials and Equipment Acceptance] number) for use as Interior Finishes
  2. Los Angeles Department of Building and Safety (Product must have a LARR [Los Angeles Research Report] number) for use as Light-transmitting Panels
- E. Shop Drawings: Include plans, elevations, sections, panel dimensions, details, and attachments to other work.
- F. Samples for Initial Selection:
1. Submit minimum 2-inch by 2-inch samples. Indicate full color, texture and pattern variation.
- G. Samples for Verification:
1. Submit minimum 4-inch by 4-inch sample for each type, texture, pattern and color of solid plastic fabrication.
- H. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.
- 1.4 QUALITY ASSURANCE
- A. Manufacturers Qualifications
1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least five (5) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been successful for use five (5) years or longer.
  2. Manufactured panels must be produced from a minimum of 40% post-industrial recycle content. This recycle content must be certified by a recognized 3<sup>rd</sup> party certification group, such as Scientific Certification Systems (SCS).
  3. Manufacturer must offer a documented reclaim process that will take back, at the manufacturers cost, panels that are at their end-of life cycle. Return process is preceded by following requirements highlighted in Section 02 42 00 Removal and Salvage of Construction Materials.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver Plastic Fabrications, systems and specified items in manufacturer's standard protective packaging.
- B. Do not deliver Plastic Fabrications, system, components and accessories to Project site until areas are ready for installation.
- C. Store materials in a flat orientation in a dry place that is not exposed to exterior elements.

- D. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.
- E. Before installing Plastic Fabrications, permit them to reach room temperature.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install Solid Polymer Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

#### 1.7 WARRANTY

- A. Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.
- B. Warranty Period: 1 year after the date of substantial completion.
- C. The warranty shall not deprive the owner of other rights or remedies the Owner may have under other provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Manufacturer: 3form, Inc., Salt Lake City, Utah, USA / Kevin Chesworth / telephone 801-651-0687

#### 2.2 MATERIALS

- A. Varia™ produced from ecoresin™ Sheet
  1. Engineered polyester resin
  2. Sheet Size: Maximum 4' x 10'
  3. Thickness: Minimum 1/16"
  4. Basis of Design Product: The design of Plastic Fabrications is based on Varia™ produced with ecoresin™ as provided by 3form, Inc. Products from other manufacturers must be approved by the Architect or Designer prior to bidding in accordance with the Instructions to Bidders and Section 10 60 00 "Product Requirements".
- B. Chroma™ produced from resin sheet
  1. Optical grade engineered resin
  2. Sheet Size: Maximum 4' x 10"
  3. Thickness: Minimum 1/2"
  4. Basis of Design Product: The design of Plastic Fabrications is based on Chroma™ produced with resin as provided by 3form, Inc. Products from other manufacturers must be approved by the Architect or Designer

prior to bidding in accordance with the Instructions to Bidders and Section 10 60 00 "Product Requirements".

- 5.
- C. Interlayer Materials: Compatible with polyesters and bonding process to create a monolithic sheet of material when complete.
- D. Sheet minimum performance attributes:
  1. Rate of Burning (ASTM D 635). Material must attain CC1 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
  2. Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650°F.
  3. Density of Smoke (ASTM D 2843). Material must have a smoke density less than 75%.
  4. Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1".
  5. Room Corner Burn Test (NFPA 286). Material must meet Class A criteria at 1/4" thickness as described by the 2003 *International Building Code*.
  6. Extent of Burning (UL 94). Must submit UL card.
  7. Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
  8. Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8" thickness.
  9. UPITT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood".
  10. Dynamic environmental testing (ASTM standards D 5116 and D 6670). Panels must not have detectable VOC off-gassing agents and must be have Greenguard™ Indoor Air Quality certified.
  11. Panels must be produced from a minimum of 40% post-industrial recycle content. This recycle content must be certified by a recognized 3<sup>rd</sup> party certification group, such as Scientific Certification Systems (SCS).
  12. Building Approvals: Plastic Fabrications are to have been evaluated and must be registered with and comply to requirements of the following jurisdictions:
    - a. New York Department of Buildings (Product must have an MEA [Materials and Equipment Acceptance] number) for use as Interior Finishes
    - b. Los Angeles Department of Building and Safety (Product must have a LARR [Los Angeles Research Report] number) for use as Light-transmitting Panels

## 2.3 FABRICATION

- A. General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.

- B. Comply with manufacturer's written recommendations for fabrication.
  - C. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.
    - 1. Sawing: Select equipment and blades suitable for type of cut required.
    - 2. Drilling: Drills specifically designed for use with plastic products.
    - 3. Milling: Climb cut where possible.
    - 4. Routing
    - 5. Tapping
  - D. Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.
    - 1. Cold Bending
    - 2. Hot Bending
    - 3. Thermoforming: Acceptable only on uncoated material.
    - 4. Drape Forming
    - 5. Matched Mold Forming
    - 6. Mechanical Forming
  - E. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.
- 2.4 MISCELLANEOUS MATERIALS
- A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
  - B. Cleaner: Type recommended by manufacturer.
  - C. Fasteners: Use screws designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide threaded metal inserts for applications requiring frequent disassembly such as light fixtures.
  - D. Bonding Cements: May be achieved with solvents or adhesives, suitable for use with product and application.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of Plastic Fabrications will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

#### 3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for the installation of Plastic Fabrications.
- B. Manufacturer's shop to fabricate items to the greatest degree possible.

- C. Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.
  - D. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
  - E. Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.
- 3.3 CLEANING AND PROTECTION
- A. Protect surfaces from damage until date of substantial completion. Repair work or replace damaged work, which cannot be repaired to Architect's satisfaction.

PRODUCT DATA SHEET 1 - Solid Polymer Fabrication #1 (SPF-1)

Product: Varia Ecoresin

Color: Birch

Gauge: 1/2"

Surface Finish: Sandstone

UV Protection: Not Required

Edge Sealing: Required

Expansion/Contraction Allowance: N/A

Orientation: Vertical

Installation method: Ready To Go Partition 200.10.01

Product: Chroma

Color: Cityscape N45

Gauge: 1/2"

Surface Finish: Vellum F04

UV Protection: Not Required

Edge Sealing: Required

Expansion/Contraction Allowance: N/A

Orientation: N/A

Installation Method: Ready to Go Simple Spec 200.43

End of Section 06 06 60

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**SECTION 061000- ROUGH CARPENTRY**

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Rough carpentry, complete, as shown on Drawings and as specified, including:
  - 1. Miscellaneous fire-treated blocking, backing and plywood as shown and needed.
- B. Work Specified Elsewhere:
  - 1. Section 064123 – Interior Architectural Woodwork.

1.2 REFERENCE STANDARDS

- A. American Plywood Association (APA):
  - 1. Guide to Plywood Grades.
- B. American Wood Preservers Association (AWPA):
  - 1. C20; Structural Lumber - Fire-Retardant Treatment by Pressure Process.
  - 2. C27; Plywood - Fire-Retardant Treatment by Pressure Process.
  - 3. M4; Standard for the Care of Preservative-Treated Wood Products.
- C. West Coast Lumber Inspection Bureau (WCLIB):
  - 1. Standard Grading Rules for West Coast lumber.
- D. Western Wood Products Association (WWPA):
  - 1. Western Lumber Grading Rules.

1.3 SUBMITTALS

- A. Comply with requirements of Section 013300 – Submittal Requirements.
- B. Shop Drawings: Show specially fabricated rough hardware.

1.4 QUALITY ASSURANCE

- A. Comply with latest edition of the following standards:
  - 1. Western Coast Lumber Inspection Bureau (WCLIB) "Standard Grading Rules No. 16."
  - 2. Western Wood Products Association (WWPA) "Grading Rules for Western Lumber."

3. American Plywood Association (APA) "Guide to Plywood Grades."
  4. United States Product Standard (PS) "Construction and Industrial Plywood" (PS 1-74).
  5. American Wood Preserver's Association (AWPA):
    - a. "Structural Lumber - Fire-Retardant Treatment by Pressure Process" (AWPA C27-74).
    - b. "Plywood - Fire-Retardant Treatment by Pressure Process" (AWPA C27-74).
- B. Grade Marks: Identify all wood materials by official grade mark.
1. Lumber: Mark each piece of lumber with grade mark WCLIB (or WWPA) or of agency certified by WCLIB (or WWPA), and accompany each mill shipment to site by certificate of inspection by WCLIB (or WWPA) and FR-S where fire treatment is required.
  2. Softwood Plywood: Show Type, Grade, Class and Identification Index; per APA Guide to Plywood Grades, and per requirements of NBS PS-1.
- C. Fire-Retardant Treatment:
1. Fire-Retardant Treatment: UL classification FR-S.
  2. Obtain each type of fire-retardant treated wood products from one source for both treatment and fire-retardant formulation.
- D. Pressure treatment shall not adversely affect application, permanence, or appearance of finish paint systems.
- 1.5 PRODUCT HANDLING
- A. Facilities: Provide proper facilities for handling and storage of materials to prevent damage to edges, ends, and surfaces.
  - B. Storage: Keep materials dry. Stack materials off ground on level flat forms, fully protected from weather.
- 1.6 PROJECT CONDITIONS
- A. Environmental Requirements: Maintain uniform moisture content of lumber at not more than 19 percent before, during and after installation.
  - B. Sequencing and Scheduling: Coordinate details with other Work supporting, adjoining or fastening to rough carpentry Work.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Wood (all wood shall be fire treated):
  1. Lumber: Douglas fir; No. 3 or construction grade per WCLIB.
  2. Plywood: NBS PS-1 - grade structural one, C-C exterior.
  3. Use only material that is free of urea-formaldehyde.
- B. Fasteners:

1. Nails: Common wire typical.
2. Powder-Actuated Devices (PAD): As specified in Section 050500 – Metal Fasteners.
3. Expansion Bolts: As specified in Section 050500 – Metal Fasteners.
4. Miscellaneous Hardware: Provide common screws, bolts, fastenings, washers and nuts, and other items required to complete rough carpentry Work.
5. Finish: Hot-dip galvanize fasteners for exterior work.

## 2.2 ROUGH HARDWARE

- A. All exterior hardware shall be hot-dipped galvanized per ASTM A-123 Standards.
1. Nails:
    - a. Common wire for typical framing, blocking, etc. Box nails will not be allowed.
    - b. Annular ring common wire nails for plywood floor.
  2. Bolts: Hexagonal heads, Grade A conforming to ASTM A307.
  3. Washers: Washers for bearing against wood shall be provided under all bolt heads and nuts.
    - a. Malleable iron or steel plate having an area equal to 16 times the area of bolt or lag screw.
    - b. Steel washers shall have a thickness not less than 1/10 the length of the washer's longest side.
    - c. Malleable iron washers shall have a thickness not less than 1/2 the bolt or lag screw diameter and having a bearing surface for the nut or head equal in diameter to not less than the long diameter of the nut or head.
  4. Anchor Bolts: Hexagonal heads, Grade A conforming to ASTM 307, 1-1/2-inch-diameter by 10 inch.
  5. Rough Framing Connectors: KC Metal Products or approved equal. For connector type, see Drawings.
- B. Powder Driven Fasteners, Expansion Bolts and Expansion Anchors: As specified under 050500 – Metal Fasteners.

## 2.3 FABRICATION

- A. Lumber:
1. Moisture Content: Air- or kiln-dry to 19 percent maximum moisture content at time of surfacing.
  2. Finish: Surfaced four sides, S4S, unless otherwise specified.
  3. Size: Per rules of governing standard. Sizes shown are nominal unless otherwise specified.
- B. Fire-Retardant Treated Lumber and Plywood: Pressure treat rough carpentry materials per Reference Standards to obtain specified UL Classification.
1. Type: Hoover Treated Wood Products, "Exterior Fire-X," or equal.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verification of Conditions: Examine areas to receive rough carpentry Work and verify following:
1. Completion of installation of building components to receive rough carpentry Work.
  2. That spacing, direction, and details of supports are correct to accommodate installation of blocking, backing, stripping, furring, and nailers.
  3. That surfaces are satisfactory to receive Work. Do not commence installation until unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. General: Provide wood blocking, backing, furring, grounds, nailers, stripping, and similar items as detailed and otherwise required to anchor fixtures and equipment to be installed by other trades. Perform cutting, boring, and similar Work required. Install members true to line. Fit accurately. Secure rigidly. Provide special framing, even if not specifically shown, as required to properly complete Work.
- B. Sills or Plates on Concrete: Set in grout if surface of concrete deviates from true plane by more than 1/16-inch in 4 feet. Anchor with bolts as shown. Use two bolts minimum per piece with one bolt located between 4 inches and 8 inches from each end of each piece of sill.
- C. Nail Joints: Per minimum requirements of applicable code unless otherwise shown.
- D. Plywood: Sheet layout, nailing and edge-blocking as shown. Gap joints 1/16-inch. Butt joints accurately at centerlines of supporting members.
- E. Fasteners:
1. General: Furnish and accurately locate items to be embedded in concrete. Secure such items in place before concrete is poured.
  2. Nails: If wood tends to split, pre-drill holes three-fourths of nail diameter.
  3. Lag Screws: Screw into place; do not hammer. Use soap or other lubricant to ease insertion. Pre-drill holes diameter of shank for unthreaded portion, two-thirds of shank diameter for threaded portion.
  4. Bolts and Nuts: When installed, bear no more than 1/2-inch of threads on wood and allow no more than 1/2-inch of bolt to project beyond nut. Drill bolt holes 1/32-inch oversize. Tighten nuts snug when placed, and re-tighten at end of job or just before closing in.
  5. Sheet Metal Fasteners: Nail or bolt per manufacturer's instructions. Nail or bolt holes. Use nails provided by manufacturer.

## 3.3 PLYWOOD BACKING FOR TELEPHONE AND ELECTRICAL EQUIPMENT

- A. Panels: Not less than 3/4-inch thick. Use largest sizes practicable.

- B. Joints: Tightly butt vee-joints.
- C. Finish: Slightly ease exposed edges, sandpaper smooth as required.
- D. Fastening: Secure to metal studs and backing plates with flat-head countersunk sheet metal screws at 12-inch centers at panel edges and at 16-inch centers in panel field.

END OF SECTION

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**SECTION 064123- INTERIOR ARCHITECTURAL WOODWORK**

## 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. Work Included: Provide and install Casework, complete, as shown on Drawings and as specified. All casework to be:

**AWI Premium Grade Fabrications.**

- B. This Section includes the following:

1. Plastic-laminate cabinets.
2. Plastic-laminate countertops.
3. Solid-surfacing-material countertops.

- C. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
2. Division 8 Section "Flush Wood Doors."

## 1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

## 1.4 SUBMITTALS

- A. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

- B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.

1. Plastic laminates.
2. Shop-applied transparent finishes.

- C. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish.
2. Solid-surfacing materials, 6 inches square.
3. One sample door with required hardware.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed architectural woodwork 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.
- B. Fabricator Qualifications:
  1. Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
  2. Shop is a certified participant in AWI's Quality Certification
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.
  1. Provide AWI certification labels or compliance certificate indicating that woodwork complies with requirements of grades specified.
- D. Single-sourcing materials: It is the intent of the Contract Documents to single-source plastic laminate and solid surface materials specified in this section when scheduled on the drawings to assure matching of specified finishes.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with



fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species and Cut for Transparent Finish: see finish schedule – coordinate w/ owner.
- C. Wood Products: Comply with the following:
  - 1. Hardboard: AHA A135.4.
  - 2. Softwood Plywood: DOC PS 1, Medium Density Overlay.
  - 3. Hardwood Plywood and Face Veneers: HPVA HP-1.
- D. Thermoset Decorative Overlay: Particleboard complying with ANSI A208.1, Grade M-2, or medium-density fiberboard complying with ANSI A208.2, Grade MD, with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
  - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by the following:
    - a. Wilsonart International; Div. of Premark International, Inc.
- F. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Corian Solid Surface
    - b. Cambria Quartz
  - 2. Type: Standard slab type, unless Special Purpose type is indicated.

3. Colors and Patterns: As per finish schedule.
  
- G. Adhesive for Bonding Plastic Laminate: Contact cement.
  
- H. Edge-banding:
  1. Edge-banding for cabinet body parts shall be purified 3 mm PVC applied with hot melt glue by automatic edge-banding equipment.
  2. Edge-banding for door and drawer fronts shall be purified 3 mm PVC applied with hot melt glue by automatic edge-banding equipment. Edges and corners shall be rounded with a 3 mm radius and scraped free from machining or chatter marks.
  3. Color shall match vertical laminate at cabinets or as selected by Architect from manufacturer's full color range for solids and patterns.
  
- I. Cores:
  1. All sides, tops, countertops, bottoms, doors, drawer fronts, and partitions shall have minimum  $\frac{3}{4}$ " thick multi-core premium grade panel product cores manufactured for uses as a core material for laminated casework. Provide 1-inch thickness for bottom panel of wall hung units (same as shelves).
  2. Shelf Cores: Shelves shall have the same core material as specified for the cabinet body except provide 1-inch thickness.
  3. Multi-Core Panel Products:
    - a. Simpson Plyron, Simpson.

## 2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
  
- B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.
  
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening.
  
- D. Door and Drawer Pulls: Back mounted, 4 inches long, bow style pull.
  
- E. Catches: Magnetic catches, BHMA A156.9, B03141.
  
- F. Shelf Rests: BHMA A156.9, B04013.
  
- G. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091, and rated for the following loads:
  1. Box Drawer Slides: 100 lbf.
  2. Pencil Drawer Slides: 45 lbf.

- H. Door Locks: BHMA A156.11, E07121. **(Typical at base cabinets at sink locations and all tall cabinets)**
- I. Drawer Locks: BHMA A156.11, E07041.
- J. Grommets for Cable Passage through Countertops: 2-1/2-inch black, molded-plastic grommets and matching plastic caps with slot for wire passage.
- K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Satin Chromium Plated: BHMA 652 for steel base.
- L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

### 2.3 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

### 2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide **Premium Grade** interior woodwork complying with the referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

### 2.5 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 300.
- B. Grade: **Premium.**

### 2.6 PLASTIC-LAMINATE CABINETS

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.

- B. Grade: **Premium.**
- C. AWI Type of Cabinet Construction: Flush overlay.
- D. Laminate Cladding for Exposed Horizontal Work-Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Horizontal Surfaces (Worksurfaces, Countertops): Acid Resistant Laminate "Chemsurf" Type 390.
- E. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Horizontal Surfaces Other Than Tops: HGS.
  - 2. Vertical Surfaces: HGS.
  - 3. Edges: PVC T-mold matching laminate in color, pattern, and finish.
  - 4. Countertop and Backsplash: Chemical resistant plastic laminate.
- F. Materials for Semi-exposed Surfaces: Provide surface materials indicated below:
  - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
  - 2. Drawer Sides and Backs: Solid-hardwood lumber.
  - 3. Drawer Bottoms: Hardwood plywood.
- G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. Field Verify to match plastic laminate cabinet and countertop with the adjacent existing in the following categories:
    - a. Solid colors.
    - b. Patterns.

## 2.7 SOLID-SURFACING-MATERIAL COUNTERTOPS

- A. Grade: Premium.
- B. Solid-Surfacing-Material Thickness: 3/4 inch.
- C. Solid-Surfacing-Quartz -Material Thickness: 2 cm.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
  - 1. Match project finish schedule. Provide Architect with sample for verification.
- E. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
  - 1. Fabricate tops with shop-applied edges of materials and configuration indicated.

2. Provide Integral back splash.
3. Provide Integral side splash where countertop abuts perpendicular wall.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

### 3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation.
- E. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

2. Secure backsplashes to tops and to walls.
3. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."
4. Cut circular openings in countertop for electrical cord access below countertop. Provide a grommet around opening for finish appearance. Color of grommet to match countertop. The number of openings required will be determined by the Owner but will not exceed 10.
5. Cut openings in countertops for the installation of grilles as indicated on the drawings and as approved by Architect.
6. Provide full bullnose edge, typical.

### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

## SECTION 068300 COMPOSITE PANELING

## PART 1 - GENERAL

## 1.01 SUMMARY

- A. Section Includes: Paneling materials to create sculptured wall surface.
  - 1. Soelberg Industries:
    - a) Finish: Amati Walnut
    - b) Pattern: Piastra
    - c) Core: 3/4" MDF and 1-1/8" MDF
    - d) Orientation: Planks shall run horizontally

## 1.02 REFERENCES

- A. Abbreviations and Acronyms:
  - 1. ANSI: American National Standards Institute
  - 2. ASTM: American Society for Testing and Materials
  - 3. CPA: Composite Panel Association
  - 4. LEED: Leadership in Energy and Environmental Design
  - 5. MDF: Medium Density Fiberboard
  - 6. USGBC: US Green Building Council
  - 7. SFI: Sustainable Forestry Initiative

## 1.03 SUBMITTALS

- A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 33 00 "Submittal Procedures".
- B. Product data and detailed specifications for each system component and installation accessory required, including installation methods.
- C. Shop drawings showing locations, seam locations, pattern orientation, installation method, corner conditions and installation details of panel products.
- D. Samples for verification purposes: Submit the following samples, as proposed for this work, for verification of color, texture, pattern and thickness:
- E. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.
- F. Maintenance data for wall system components for inclusion in the operating and maintenance manuals specified in Division 1.

## 1.04 QUALITY ASSURANCE

- A. Installer qualifications: Engage an installer who has no less than 3 years experience in installation of panels similar in complexity to those required for this project.
- B. Product quality standard. Quality grade to be premium.
- C. Code compliance: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, BOCA and Life Safety.
- D. Fire performance characteristics: Provide wall panels fabricated from fire rated materials tested in accordance with ASTM-E84 (CAN/ULC S102.2) for Class 1 characteristics listed below:
  - 1. Flame spread 25 or less

## 1.05 DELIVERY, STORAGE AND HANDLING

- A. Immediately upon delivery, contractor must open crate and inspect goods prior to signing the bill of lading. This must occur regardless of any visible signs of external damage to the

crating material. Freight Damage is not the responsibility of Soelberg Industries. If damage is found, contractor must sign for the freight as damaged and the driver must acknowledge that the contractor is signing for damaged freight. It is the responsibility of the contractor to file any and all freight claims resulting from this process. Soelberg Industries has no liability after the goods are shipped from Seller's address. Store materials in original, undamaged packaging in a clean, dry place out of direct sunlight and exposure to the elements. A room temperature of 40-100°F (4-38°C) should be maintained.

B. Materials must be stored flat.

#### 1.06 PROJECT CONDITIONS

- A. HVAC: Operate HVAC system to maintain occupancy level temperature and relative humidity conditions (25-55 percent) in the area of installation from 48 hours prior to delivery of panels to the installation area through remainder of construction period.
- B. Materials must be acclimated in an environment of 65-75°F (18-24°C) with maintained relative humidity levels of 25-55% for at least 48 hours prior to beginning the installation.
- C. Lighting: Permanent project lighting, including any special lighting used to highlight the panels, must be operational during installation.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Interior wall panel product specified shall be manufactured by:  
Soelberg Industries  
248 South Mountain Way Drive  
Orem, UT 84058  
(801)434-9450  
[www.soelbergi.com/textur3d](http://www.soelbergi.com/textur3d)

#### 2.02 MATERIALS

- A. Wall Panels to be pattern Liscio
- B. Core Material MDF

#### 2.03 INSTALLATION COMPONENTS: HORIZONTAL/VERTICAL

- A. Construction Adhesive

#### 2.04 FABRICATION

- A. General: Fabricate wall panels to comply with requirements indicated for design, dimensions, detail, finish and sizes. All based upon required field verified dimensions.

#### 2.05 FINISHES

- A. Prefinished –Matte White

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
- B. Verify that permanent project lighting is in place and operational prior to start of install.
- C. Coordinate with responsibly entity to correct unsatisfactory conditions.
- D. Commencement of work by installer is acceptance of conditions.



3.02 PREPARATION

- A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles.
- B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions. Store flat and in HVAC controlled area at all times.

3.03 INSTALLATION

- A. Install in accordance with the Manufacturer's recommendations and the required field verified dimensions.

3.04 CLEANING

- A. General: Immediately upon completion of installation, clean wall panels and accessories in accordance with manufacturer's recommended cleaning method.

3.05 PROTECTION

- A. Protect installed materials to prevent damage during remainder of construction period. Store flat and in HVAC controlled area at all times.

END OF SECTION 068300

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**SECTION 078413 – PENETRATION FIRESTOPPING**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Provide materials, fabrications and installation of firestopping and smoke seals, and associated accessory items, for locations listed under System Description.

## 1.2 SYSTEM DESCRIPTION

- A. Provide firestopping and smoke seals at locations indicated on the drawings, and including the following areas:
  - 1. All openings in fire or smoke rated floors, partitions, and walls in both void spaces and those spaces accommodating penetrating items such as cables, conduits, pipes, ducts, etc.
  - 2. Openings at building perimeter between floor slab edges and exterior wall assemblies.
    - a. Wall assemblies composed of metal framing and sheathing products specified in Section 054000 – Cold-formed Metal Framing.
    - b. Window Wall specified in Section 084113 and 085113 – Aluminum Windows.
  - 3. Openings between tops of partitions and connecting floors or roof assemblies.
  - 4. Fire barriers for seismic joints in fire-rated walls and floors.
  - 5. Openings at each floor level in shafts or stairwells.
- B. Fire-rated and/or Smoke-rated assemblies identified on Drawings by an Underwriter's Laboratories (UL) listing number shall strictly conform to the listed assembly. Any deviations from the UL assembly shall be approved by the code enforcement authority having jurisdiction for the Project before undertaking work.

## 1.3 SUBMITTALS

- A. Comply with provisions of Section 013300 – Submittal Procedures.
- B. Submit manufacturer's printed product data indicating product characteristics, performance and limiting criteria.
- C. Submit manufacturer's shop drawings and installation instructions for each type of firestop or smoke seal required by the Project. Shop drawings shall indicate the detailing of all necessary anchorages, reinforcements and fastenings required.

- D. Mock-Ups: Prepare a job-site mock-up of each fire-stop and smoke seal assembly proposed for use in the Project for review by Owner and code enforcement authority having jurisdiction for the Project. Accepted mock-ups may be left in place as part of the finished project and will constitute the standard for remaining work.
- E. Qualification Data: For firms and persons specified in Quality Assurance article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

#### 1.4 QUALITY ASSURANCE

- A. Comply with latest edition of the following standards:
  - 1. American Society for Testing Materials (ASTM), ASTM E 814.
  - 2. Underwriters' Laboratories, Inc.'s "Building Materials Directory" (UL).
  - 3. Warnock Hersey, "Certification Listings" (WHI).
- B. Firestopping or smoke seal materials shall conform to both Flame (F) and Temperature (T) ratings per ASTM E 814 or UL 1479 fire tests, and shall restrict the transmission of temperature as well as the passage of flame, gasses, smoke and water.
- C. Firestopping and smoke seal work shall be performed by an installer trained or approved by the firestop or smoke seal manufacturer. Equipment used shall be in accordance with firestop or smoke seal manufacturer's written installation instructions.
  - 1. Openings between tops of partitions and connecting floors or roof assemblies and at partition terminations at exterior wall:
    - a. For top of partition conditions, Architect to select two nominal 10-linear foot rated wall assemblies including parallel to, and perpendicular to, metal deck flutes for Mock-Up. For termination of partition at exterior wall, Architect to select a representative example for each type of rated wall assembly and each type of exterior wall system for Mock-Up. Location shall provide convenient access for review and be early in Contractor's Project Schedule.
    - b. After review and acceptance by Architect, Mock-Ups shall set performance standards for subsequent Work and may be incorporated into the Work.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with requirements in Section 016000 – Product Requirements.
- B. Deliver all materials in original unopened packages fully identified with manufacturer's name, trade name and UL label.
  - 1. Leave seals unbroken and labels intact until time of use.
  - 2. Remove from job site any rejected or damaged packages found unsuitable for use.

- C. Store materials in a dry place, off of the ground or floor, and away from other material subject to sweating or attraction of moisture or dampness.

#### 1.6 PROJECT CONDITIONS

- A. Conform to the manufacturer's printed instructions for installation and, when applicable, curing in accordance with the manufacturer's recommendations regarding temperature and humidity.
- B. Conform to all required ventilation and safety requirements.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Provide products as manufactured by:
  - 1. Firestop Systems, Inc.
  - 2. Dow Corning Corp.
  - 3. 3M Electrical Products Division.
  - 4. International Protective Coatings (IPC).
  - 5. RectorSeal/Bio-Fireshield.

#### 2.2 MATERIALS

- A. General: Firestopping and smoke seal materials shall be asbestos free.
  - 1. The F rating must be a minimum of 1 hour, but not less than the fire resistance rating of the assembly being penetrated, when tested per ASTM E 814.
  - 2. Materials being applied in openings between elements of differing fire ratings shall conform to the most restrictive rating.
  - 3. Fire tests shall be conducted with a minimum positive pressure differential of 0.03 inches of water column.
  - 4. Material shall be noncombustible, with flame spread of 25 or less, and smoke development of 50 or less, when tested in accordance with ASTM E 84.
- B. Firestop or Smoke Seal Mortar: Single component portland cement fly ash mortar, requiring no special supports or anchoring devices to pass water hose stream tests.
- C. Firestop or Smoke Seal Sealant: Single or multiple component silicone sealant. Provide a flexible, air-tight, water proof seal that bonds to building materials.
- D. Firestop or Smoke Seal Sleeve: Prefabricated device used around plastic pipes in fire-rated floors and walls. The sleeve shall be made of a steel collar lined with an intumescent material.
- E. Intumescent Mastic Sealant: Single component, water-based intumescent for use at openings and sleeves involving plastic pipe, insulated pipe or flexible cable.
- F. Mineral fiber board, mineral fiber matting, and mineral fiber putty-forming and

damming materials shall be used to contain the fluid material mixture prior to and during filling of penetrations and voids.

1. Fire tested and functionally approved forming materials may be left in place to become an integrally part of the foamed penetration seal.
  2. Combustible forming and damming materials may be used for containment during installation of materials only, and must be removed from the final completed penetration seal system.
- G. Cementitious Seal: W.R. Grace's Monokote MK-6, or approved equivalent.
- H. Provide primers as required which conform to manufacturer's recommendations for various substrates and conditions.
- I. Thermal Spray-on Elastomeric Smoke Seal: Specified Technologies Inc. Series AS200 Elastomeric Spray, or approved equivalent.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine all work upon which firestopping or smoke seal material is to be applied.
- B. Notify the Contractor in writing, of conditions detrimental to the timely completion of the work.
- C. Do not proceed with work until all unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Prior to application of firestopping or smoke seal material.
1. Clean all steel of loose material, including excessive mill scale or rust, paint, grease or other material which would preclude the successful application and retention of bond to the substrate.
  2. Do not apply firestops or smoke seals to surfaces previously painted or treated with a sealer, curing compound, water repellent or other coatings unless tests have been performed to ensure compatibility of materials.
  3. Remove coatings as required in compliance with manufacturer's instructions.
- B. Provide primers as required which conform to manufacturer's recommendations for various substrates and conditions.
- C. Mask where necessary to protect adjoining surfaces. Remove excess material and stains on surfaces as required.
- D. Coordinate locations and sizes of all sleeves which will be required by the work of other Sections.

## 3.3 INSTALLATION

- A. Install in strict accordance with manufacturer's printed instructions to provide a Flame (F) rating of at least 1 hour, but not less than the fire resistance rating of the assembly being penetrated.
- B. Ensure that anchoring devices, back-up materials, clips, sleeves, supports and other materials used in the actual fire test are installed.
- C. Install firestops or smoke seals with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal.
- D. Install fire resistant filler in all openings through floors and rated walls:
  - 1. Dam bottom of vertical openings and one side of horizontal openings with temporary containment forms or, where required to achieve fire resistance ratings, provide permanent mineral composition board forms.
  - 2. On horizontal penetrations, provide partial face containment forms where required for material placement.
  - 3. Allow installed fillers to cure, and remove temporary forms; trim ragged edges with sharp knife; inspect and fill voids with additional filler to form uniform thickness of filler.
- E. Spillage: Do not allow sealants to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
- F. Recess exposed edges of gaskets and exposed joint fillers slightly behind adjoining surfaces, unless otherwise shown, so that compressed units will not protrude from joints.
- G. Tool or trowel exposed surfaces. Remove excess firestop or smoke seal material promptly as work progresses and upon completion.
- H. Apply firestop or smoke seal material at penetrations of insulated piping after the insulation is installed.
  - 1. The material used shall have been tested for compatibility and rating in conjunction with the use of the insulation material being used.
  - 2. Calcium silicate, or other pipe insulation, may be substituted for fiberglass pipe insulation through the sleeve, if the insulation is part of an assembly which meets the requirements specified for firestopping or smoke sealing.
- I. Firestopping or smoke sealing materials for filling voids in floors having openings of 4-inches or greater, shall be installed to support the same load as the floor system, unless the area is protected by a permanent barrier preventing loading or traffic on the firestopped or smoke sealed area.
- J. Walls and Partitions:
  - 1. Penetrations: Install firestopping and smokestopping material at wall and partition openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping and smokestopping.
  - 2. Systems for Partition to Overhead Floor and Roof Deck Intersections: Use one of following at Contractor's option:

- a. Premolded Firestops: Firestop openings and joints per manufacturer's recommendations and UL or WHI-listed assembly with pre-molded firestops, firestop moldings, and unfaced safing.  
\*\*\*\*\* OR \*\*\*\*\*
- b. Cementitious Seal Firestops: Firestop openings and joints per manufacturer's recommendations and UL or WHI-listed assembly with spray-applied or trowel-applied cementitious seal.  
\*\*\*\*\* OR \*\*\*\*\*
- c. Firedam Spray Seal and Safing Firestops:
  - 1) General: 3M Firedam Spray. Provide 1- and 2-hour-rated firestopping assembly at head of partition with double-track construction at 1/2-inch relief joint at gypsum board in conformance with Warnock Hersey, Inc. Designs, 495-1266 and 495-PSV-1083.
  - 2) Safing: Fill space between tracks with 3/4-inch-thick by stud width strip of 3.5 PCF density mineral wool.
- K. Floor Slab Edge and Exterior Wall Intersection: Firestop Systems, Inc. **System CW-S-1002**, 2-hour firestop joint per manufacturer's recommendations with 8-pound mineral wool, 3-1/2-inch-thick SP5100 sealant, or approved equal system with UL or WHI-listed 2-hour assembly.
- L. Continuity: Maintain integrity over entire area to form continuous firestop system.

3.4 CURE AND PROTECTION

- A. Cure firestopping and smoke seal materials in compliance with manufacturer's instructions and recommendations.
- B. Installer shall advise Contractor of procedures required for protection of firestopping and smoke seals during remaining construction period.

3.5 FIELD QUALITY CONTROL

- A. Examine each firestop or smoke seal application after completion of installation, to ensure proper installation and full compliance with this specification.
- B. Correct unacceptable firestops or smoke seals and provide additional inspection to verify compliance with this specification at no additional cost.
- C. Maintain accessibility to all areas of work until completion of inspection by the applicable Code authorities.
- D. Where finished work will be visible after completion of the Project, remove temporary dams after initial cure of firestops or smoke seals.
  - 1. Clean adjacent surfaces in accordance with Manufacturer's printed instructions.
  - 2. Remedy any staining and discoloring on adjacent surfaces caused by the work of this Section.

3.6 CLEAN UP



- A. Comply with requirements of Section 017900 – Cleaning.
- B. After completion of application of firestopping or smoke seal materials, remove all debris, excess materials and all equipment, and broom clean all exposed wall and floor areas.

END OF SECTION

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**SECTION 079200 - JOINT SEALANTS**

## 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 sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
  - a. Perimeter joints between materials listed above and frames of doors and windows.
2. Exterior joints in the following horizontal traffic surfaces:
  - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
  - a. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
  - b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
  - c. Joints between plumbing fixtures and adjoining walls, floors, and counters.
  - d. Other joints as indicated.

## 1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

## 1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS AND MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

### 2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

### 2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

### 2.4 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: For each product of this description indicated in the Acoustical Joint-Sealant Schedule at the end of

Part 3, provide manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

## 2.5 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

## 2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
  1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and com-

- patibility by sealant manufacturer), old joint sealants, oil, grease, water-proofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
  3. Remove laitance and form-release agents from concrete.
- B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.
- F. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
  1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealants from surfaces adjacent to joint.
  2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- 3.4 CLEANING
- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- 3.5 PROTECTION
- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.
- 3.6 ELASTOMERIC JOINT-SEALANT SCHEDULE
- A. Multicomponent Nonsag Polysulfide Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Provide one of the following:
    - a. cm-60; W.R Meadows, Inc.
    - b. T-2235-M; Morton International, Inc.
    - c. T-2282; Morton International, Inc.
    - d. Thiokol 2P; Morton International, Inc.
    - e. GC-5 Synthacalk; Pecora Corporation.
    - f. Two-Part Sealant; Sonneborn Building Products Div., ChemRex Inc.
  2. Type and Grade: M (multicomponent) and NS (nonsag).
  3. Class: 25.
  4. Uses Related to Exposure: T (traffic)
- 3.7 LATEX JOINT-SEALANT SCHEDULE
- A. Latex Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Provide one of the following:
    - a. Chem-Calk 600; Bostik Inc.
    - b. NuFlex 330; NUCO Industries, Inc.

- c. LC 160 All Purpose Acrylic Caulk; Ohio Sealants, Inc.
- d. AC-20; Pecora Corporation.
- e. PSI-701; Polymeric Systems, Inc.
- f. Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
- g. Tremflex 834; Tremco.

### 3.8 ACOUSTICAL JOINT-SEALANT SCHEDULE

- A. Acoustical Sealant for Exposed and Concealed Joints: At all sound partitions and where joint sealants of this type are indicated, provide products complying with the following:
  - 1. Products: Provide one of the following:
    - a. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corporation.
    - b. SHEETROCK Acoustical Sealant; USG Corp., United States Gypsum Co.
- B. Acoustical Sealant for Concealed Joints: At all sound partitions and where joint sealants of this type are indicated, provide products complying with the following:
  - 1. Products: Provide one of the following:
    - a. Pro-Series SC-170 Rubber Base Sound Sealant; Ohio Sealants, Inc.
    - b. BA-98; Pecora Corporation.
    - c. Tremco Acoustical Sealant; Tremco.

END OF SECTION



**SECTION 081113 - HOLLOW METAL DOORS AND FRAMES**

## 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. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

## B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Flush Wood Doors".
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Section "Door Hardware".
5. Division 08 Section "Access Control Hardware".
6. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

## C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
  1. Elevations of each door design.
  2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  4. Locations of reinforcement and preparations for hardware.
  5. Details of anchorages, joints, field splices, and connections.
  6. Details of accessories.
  7. Details of moldings, removable stops, and glazing.
  8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
  1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
  - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
  - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
  - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
    - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

## 1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
  - 1. CECO Door Products (C).
  - 2. Curries Company (CU).

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

## 2.3 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
  - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  - 3. Manufacturers Basis of Design:
    - a. Curries Company (CU) - M Series.

- C. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

## 2.4 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  - 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
  - 3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.5 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

## 2.6 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.7 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Frames:
1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
  2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
  3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
  4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
  5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
  6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
  7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
  8. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
    - a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    - b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
    - c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
    - d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  10. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches high.
      - 2) Three anchors per jamb from 60 to 90 inches high.
      - 3) Four anchors per jamb from 90 to 120 inches high.
      - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
    - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Three anchors per jamb up to 60 inches high.
      - 2) Four anchors per jamb from 60 to 90 inches high.
      - 3) Five anchors per jamb from 90 to 96 inches high.
      - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
  11. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
- D. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## 2.8 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer

manufacturer for substrate; and compatible with substrate and field-applied coatings.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

#### 3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.



4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION

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**SECTION 081416 - FLUSH WOOD DOORS**

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. Section Includes:

- 1. Solid core doors with wood veneer faces.
- 2. Factory finishing wood doors.
- 3. Factory fitting wood doors to frames and factory machining for hardware.
- 4. Light frames and glazing installed in wood doors.

- B. Related Sections:

- 1. Division 08 Section "Door Schedule".
- 2. Division 08 Section "Hollow Metal Doors and Frames".
- 3. Division 08 Section "Glazing".
- 4. Division 08 Section "Door Hardware".
- 5. Division 08 Section "Access Control Hardware".

- C. Standards and References: Comply with the version year adopted by the Authority Having Jurisdiction.

- 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- 2. ANSI A208.1 - Wood Particleboard.
- 3. Intertek Testing Service (ITS Warnock Hersey) - Certification Listings for Fire Doors.
- 4. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
- 5. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
- 6. UL 10C - Positive Pressure Fire Tests of Door Assemblies; UL 1784 - Standard for Air Leakage Tests of Door Assemblies.
- 7. Window and Door Manufacturers Association - WDMA I.S.1-A Architectural Wood Flush Doors.

1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, trim for openings, and WDMA I.S.1-A classifications. Include factory finishing specifications.

- B. Shop Drawings shall include:

1. Indicate location, size, and hand of each door.
  2. Indicate dimensions and locations of mortises and holes for hardware.
  3. Indicate dimensions and locations of cutouts.
  4. Indicate requirements for veneer matching.
  5. Indicate location and extent of hardware blocking.
  6. Indicate construction details not covered in Product Data.
  7. Indicate doors to be factory finished and finish requirements.
  8. Indicate fire protection ratings for fire rated doors.
- C. Samples for Initial Selection: For factory finished doors.
1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
  2. Corner sections of doors, 8 by 10 inches, with door faces and edges representing actual materials to be used.
    - a. Provide samples for each species of veneer and core material.
    - b. Finish veneer faced door samples with same materials proposed for factory finished doors.
  3. Frames for light openings, 6 inches long, for each material, type, and finish required.
- D. Warranty: Provide sample of manufacturer's warranty.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, "Industry Standard for Architectural Wood Flush Doors".
- C. Fire Rated Wood Doors: Doors 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 at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL10C.
1. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies provide manufacturer's construction label, indicating compliance to independent 3<sup>rd</sup> party certification agency's procedure, except for size.
  2. Temperature Rise Limit: Where required and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire test exposure.
  3. Smoke Control Door Assemblies: Comply with NFPA 105.
    - c. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

- D. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for receiving, handling, and installing flush wood doors.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package pre-finished doors individually in plastic bags and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top rail with opening number used on Shop Drawings.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

#### 1.7 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
    - b. Telegraphing of core construction in wood face veneers exceeding 0.01 inch in a 3-inch span.
  - 2. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.
  - 3. Warranty Period for Solid Core Interior Doors: Life of installation.

### PART 2 - PRODUCTS

#### 2.1 DOOR CONSTRUCTION – GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty; Aesthetic Grade: Custom.
- B. Fire Rated Doors: Provide construction and core as needed to provide fire ratings indicated.
  - 1. Category A Edge Construction: Provide fire rated door edge construction with intumescent seals concealed by outer stile (Category A) at 45, 60,

and 90 minute rated doors. Comply with specified requirements for exposed edges.

2. Pairs: Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
  - a. Provide fire retardant stiles that are listed and labeled for applications indicated without formed steel edges and astragals.
  - b. Where required for concealed hardware, provide formed steel edges and astragals with intumescent seals. Finish steel edges and astragals with baked enamel.

## 2.2 CORE CONSTRUCTION

### A. Structural Composite Lumber Core Doors:

1. Structural Composite Lumber: Engineered hardwood composite wood products tested in accordance with WDMA I.S.1A, Testing Cellulosic Composite Materials for Use in Fenestration Products containing no added Urea Formaldehyde.
2. LEED: Meet requirements of IEQ4.4.

### B. Particleboard Core Doors:

1. Particleboard: Wood fiber based materials complying with ANSI A208.1 Particleboard standard. Grade LD-2.
2. Adhesive: Fully bonded construction using Polyurethane (PUR) glue.
3. Blocking: As indicated under article "Blocking".

### C. Fire Resistant Composite Core Doors:

1. Core: Non-combustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire protection rating indicated.
2. Blocking: As indicated under article "Blocking".
3. Edge Construction: At hinge stiles, provide laminated edge construction with improved screw holding capability and split resistance. Comply with specified requirements for exposed edges.

## 2.3 BLOCKING

### A. Fire Rated Doors:

1. Provide blocking as indicated below:
  - a. HB1: 5 inch in doors indicated to have closers and overhead stops.

## 2.4 VENEERED DOORS FOR TRANSPARENT FINISH

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

1. ASSA ABLOY Wood Doors (GR): GPD Series.
2. VT Industries (VT): Artistry Series.

3. Oshkosh Door Company
- B. Interior Solid Core Doors:
1. Grade: Custom.
  2. Faces: Veneer grades as noted below; veneer minimum 1/50-inch (0.5mm) thickness at moisture content of 12% or less.
    - a. **Field verify to match with adjacent existing door veneer.**
  3. Match between Veneer Leaves: Book match.
  4. Assembly of Veneer Leaves on Door Faces:
    - a. Running Match.
  5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
  6. Transom Match: Continuous match.
  7. Vertical Edges: Matching same species as faces. Wood or composite material, one piece, laminated, or veneered. Minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors.
  8. Horizontal Edges: Solid wood or structural composite material meeting the minimum requirements per WDMA section P-1, Performance Standards for Architectural Wood Flush Doors
  9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit sanded before applying face veneers.
  10. At doors over 40% of the face cut-out for lights and or louvers, furnish engineered composite lumber core.

## 2.5 LIGHT FRAMES AND GLAZING

- A. Wood Beads for Light Openings in Wood Doors up to and including 20-minute rating:
1. Wood Species: Same species as door faces.
  2. Profile:
    - a. M1 Flush Bead.
    - b. At wood core doors with 20-minute fire protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Metal Frames for Light Openings in Fire Rated Doors over 20-minute Rating: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated.
1. Manufacturers:
    - a. Air Louver (LV).
    - b. All Metal Stamping (AP).
    - c. Anemostat (AN).
    - d. Pemko (PE).
- C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with the flush wood door manufacturer's written instructions.

## 2.6 FABRICATION

- A. Factory fit doors to suit frame opening sizes indicated.
  - 1. Comply with requirements in NFPA 80 for fire rated doors.
  - 2. Undercut: As required per manufacturer's templates and sill condition.
- B. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
  - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  - 2. Metal Astragals: Factory machine astragals and formed steel edges for hardware for pairs of fire rated doors.
- C. Openings: Cut and trim openings through doors in factory.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Comply with applicable requirements in Division 08 Section "Glazing."
  - 3. Louvers: Factory install louvers in prepared openings.
- D. Electrical Raceways: Provide flush wood doors receiving electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through wire transfer hardware or wiring harness specified in hardware sets in Division 08 "Door Hardware". Wire nut connections are not acceptable.

## 2.7 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Transparent Finish: Provide a clear protective coating over the wood veneer allowing the natural color and grain of the selected wood species to provide the appearance specified. Stain is applied to the wood surface underneath the transparent finish to add color and design flexibility.
  - 1. Finish: Meet or exceed WDMA I.S. 1A TR8 UV Cured Acrylated Polyester finish performance requirements.
  - 2. Staining:
    - a. Field verify existing adjacent doors and match.
  - 3. Sheen: Satin.



## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
  - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Installation Instructions: Install doors and frames to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
  - 1. Install fire rated doors in corresponding fire rated frames according to NFPA 80.
- C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- E. Field modifications to doors shall not be permitted, except those specifically allowed by manufacturer or fire rating requirements.

## 3.3 ADJUSTING

- A. Operation: Re-hang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

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**SECTION 083113 – ACCESS PANELS**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Work Included: Provide and install access panels, complete, as shown on Drawings as specified, and if not shown on Drawings, as required to access mechanical, electrical, plumbing and other equipment in conformance with governing codes and workplace safety guidelines.
  - 1. Ceiling-mounted access panels.
- B. Work Specified Elsewhere:
  - 1. Section 092216 – Non-Structural Metal framing
  - 2. Section 092900 - Gypsum Board.
  - 3. Section 099123 – Interior Painting.

## 1.2 SUBMITTALS

- A. Conform to the requirements of Section 013300 – Submittal Requirements.
- B. Product Data: Submit manufacturer's specifications, catalog cuts, and installation instructions. Submit approved test data or State Fire Marshal listing for fire-rated assemblies.
- C. Shop Drawings: Show attachment to partition, soffit, and ceiling framing at each typical condition.

## 1.3 PRODUCT HANDLING

- A. Delivery and Storage: Deliver and store panels in manufacturer's standard protective packaging.
- B. Protection: Do not remove protective packaging until time of installation.

## PART 2 - PRODUCTS

## 2.1 ACCESS PANELS FOR CEILINGS

- A. Metal Types:
  - 1. Manufacturers: Karp Associates, Inc., Larsen's Manufacturing Co., Milcor, Nystrom, Inc., JL Industries, or equal. Karp specified as standard.
  - 2. Non-Rated Gypsum Board Partitions: Karp Type KDW, flush panel type with frame flanges for joint compound concealment, 16-gauge steel frames and 14-gauge steel doors.

3. Fire-Rated Gypsum Board Partitions: Karp Type KRP-250FR, 16-gauge steel doors and frames. Provide UL label. Provided with smoke seals.
4. Exterior Cement Plaster Soffits: Karp Type DSC-210 PL; frame of 13-gauge and door of 16-gauge galvanized steel finished with baked enamel, recessed, and lined with galvanized self-furring steel lath. Provide concealed pivoting rod hinge and key-operated stainless steel lock.

## 2.2 MISCELLANEOUS MATERIALS

- A. General: Provide fastening devices, masonry anchors, casing beads, and other items as required to secure door and frame in place.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Examine construction to receive access panels and verify correctness of dimensions and other supporting or adjoining conditions. Do not install panels until unsatisfactory conditions have been corrected. Verify that locations serve portion of work to which access is required.

### 3.2 INSTALLATION

- A. General: Install, per manufacturer's recommendations, securely to framing in locations required to give access to plumbing, mechanical, electrical, or similar devices concealed in walls or ceilings.
- B. Coordination: Coordinate with other trades to verify correct sizes and locations of access panels.

### 3.3 ADJUSTMENT

- A. General: Following installation, adjust access panels for smooth operation.

### 3.4 CLEANING

- A. General: Thoroughly clean surface of grease, oil, or other impurities, touch up abraded prime coats and otherwise prepare for finish painting.

END OF SECTION

## SECTION 087100 – 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. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Electromechanical door hardware, power supplies, back-ups and surge protection.
  - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Division 08 Section “Door Hardware”.
  - 2. Division 08 Section “Hollow Metal Doors and Frames”.
  - 3. Division 08 Section “Flush Wood Doors”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 80 - Fire Doors and Windows.
  - 4. NFPA 101 - Life Safety Code.
  - 5. NFPA 105 - Installation of Smoke Door Assemblies.
  - 6. 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.
  - 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.

2. Electrical Coordination: Coordinate with related Division 26 Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- E. 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 Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- F. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

#### 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: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders 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 in good standing 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.
  1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- D. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier 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.

- E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
    - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
    - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      - 1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
      - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
    - c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
  3. NFPA 101: Comply with the following for means of egress doors:
    - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    - b. Thresholds: Not more than 1/2 inch high.
  4. Fire-Rated Door Assemblies: Provide door hardware for 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 NFPA 252 (neutral pressure at 40" above sill) or UL-10C.
    - a. Test Pressure: Positive pressure labeling.
- 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, arrange for manufacturers' representatives to hold 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: Related Division 08 Sections (Steel, Aluminum and Wood) 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.

## 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. Seven years for heavy duty cylindrical (bored) locks and latches.
  - 2. Five years for exit hardware.
  - 3. Ten years for heavy duty floor closers.
  - 4. Two years for shallow depth floor closers.
  - 5. 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.
- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

## 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.
1. 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:
    - a. 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.
  - B. 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 as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
    - 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 where indicated in the Hardware Sets or on Drawings:
  - 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 following applications:
    - 1) Out-swinging exterior doors.
    - 2) Out-swinging access controlled doors.
    - 3) Out-swinging lockable doors.
5. Acceptable Manufacturers:
  - a. McKinney Products (MK).
  - b. IVES.

### 2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

1. Acceptable Manufacturers:
  - a. Rockwood Manufacturing (RO).
  - b. IVES.

### 2.4 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified cylindrical (bored) locksets furnished in the functions as specified in the Hardware Sets. Lock chassis fabricated of heavy gauge steel, zinc dichromate plated, with through-bolted application. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt. Locks are to be non-handed and fully field reversible.

1. Acceptable Manufacturers:
  - a. Corbin Russwin Hardware (RU) – CL3300 Series.
  - b. Schlage ND Series.

- B. Lock Trim Design: As specified in Hardware Sets.

## 2.5 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.
- B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  2. Strikes for Bored Locks and Latches: BHMA A156.2.
  3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
  4. Dustproof Strikes: BHMA A156.16.
  5. Acceptable Manufacturers:
- C. Corbin Russwin Hardware (RU) – 3300 Series; Schlage ND Series.
- D. 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 and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. 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.
  4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
    - a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
    - b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.

- c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
  - d. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.
5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.
- E. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade 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, closing sweep, and latch speed control valves. Provide non-handed units standard.
- 1. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) - DC6000 Series.
    - b. LCN 4040XP.

## 2.6 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. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.
  - a. Stainless Steel: .050-inch thick, with countersunk screw holes (CSK).
  - b. Brass or Bronze: .050-inch thick, with countersunk screw holes (CSK).
  - c. Laminate Plastic or Acrylic: 1/8-inch thick, with countersunk screw holes (CSK).
- 4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
- 5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto

edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.

6. Acceptable Manufacturers:
  - a. Rockwood Manufacturing (RO).
  - b. IVES.

## 2.7 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. Acceptable Manufacturers:
    - a. Rockwood Manufacturing (RO).
    - b. IVES.

## 2.8 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 UBC 7-2, 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, based on testing according to ASTM E 1408.

- 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. Acceptable Manufacturers:
  - 1. Pemko Manufacturing (PE).
  - 2. ZERO.

## 2.9 ELECTRIC STRIKES

- A. Acceptable Manufacturers:
  - 1. HES.
  - 2. Von Duprin

## 2.10 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.

## 2.11 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.
- B. Wood Doors: Comply with ANSI/DHI A115-W 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:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 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: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

### 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, and 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 SCHEDULE

- 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.
- B. Manufacturer's Abbreviations:

1. SD – Security Door Controls
2. MK - McKinney
3. RO - Rockwood
4. RU - Corbin Russwin
5. PE – Pemko
6. GJ – Glynn-Johnson

**Hardware Schedule****Set: 1.0**

Doors: A102A

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK	
1 Cylindrical Lock (Office)	CL3351 NZD	626	RU	
1 Closer (surface)	DC6210	689	RU	
1 Kickplate	K1050 10" X 2"LDW 3BE CSK	US32D	RO	
1 Overhead Stop	904S	630	GJ	
1 Gasketing	S44BL		PE	
1 Electric Strike	1006CS	630	HS	⚡
1 Power Supply	Provided by Access Controls			⚡
1 Card Reader	Provided by Access Controls			⚡

**Set: 2.0**

Doors: A102B, A103A

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK	
1 Cylindrical Lock (Office)	CL3351 NZD	626	RU	
1 Closer (surface)	DC6210	689	RU	
1 Kickplate	K1050 10" X 2"LDW 3BE CSK	US32D	RO	
1 Wall Stop	409	US32D	RO	
1 Gasketing	S44BL		PE	
1 Electric Strike	1006CS	630	HS	⚡
1 Power Supply	Provided by Access Controls			⚡
1 Card Reader	Provided by Access Controls			⚡

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**SECTION 088000 - GLAZING**

## 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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

- 1. Door lites (interior).

## 1.3 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- D. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

## 1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service

conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
  - a. Specified Design Wind Loads: As indicated.
  - b. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
  - c. Specified Design Snow Loads: As indicated, but not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads."
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

#### 1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch-square Samples for glass and of 12-inch-long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
  1. Each color of glass.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.9 WARRANTY

- A. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

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. Product: Subject to compliance with requirements, provide product specified.

2.2 GLASS PRODUCTS

- A. Glass: 1/4" Clear Tempered for Door Lites.
  - 1. Sealing System: Select one sealant system from subparagraphs below or insert other combinations; coordinate with manufacturers and products selected.
    - a. Manufacturer's standard sealants.
  - 2. Spacer Specifications: Manufacturer's standard spacer material and construction.

### 2.3 GLAZING GASKETS

- A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

### 2.4 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

### 2.5 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

### 2.6 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.
- C. Grind smooth and polish exposed glass edges and corners.



## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep system.
  - 3. Minimum required face or edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

## 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face

clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Do not remove release paper from tape until just before each glazing unit is installed.

### 3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

### 3.6 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection,

contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION

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**SECTION 092216 - NON-STRUCTURAL METAL FRAMING**

## 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. Non-load-bearing steel framing systems for interior gypsum board assemblies.
  - 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

## 1.3 SUBMITTALS

- A. Product Data: For each type of product.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

## 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653/A 653M, G40 (Z120) hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.

1. Steel Studs and Runners (or Dimpled Steel Studs and Runners):
  - a. Minimum Base-Metal Thickness: As indicated on Drawings.
  - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
  1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
  2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
  1. Minimum Base-Metal Thickness: As indicated on Drawings.
- E. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
  1. Depth: 1-1/2 inches (38 mm).
  2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
  1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
  2. Depth: 7/8 inch (22.2 mm).
- G. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.
  1. Configuration: hat shaped.
- H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
  1. Depth: 3/4 inch (19 mm).
  2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch (0.8 mm).
  3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

## 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- B. Hanger Attachments to Concrete:
  1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

- a. Type: Post-installed, expansion anchor.
  2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm).
- E. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
  2. Steel Studs and Runners: ASTM C 645.
    - a. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm), unless noted otherwise.
    - b. Depth: 1-5/8 inches (41 mm) unless noted otherwise.
  3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.
    - a. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
  4. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.
    - a. Configuration: hat shaped.
- F. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    - b. Chicago Metallic Corporation; Drywall Grid System.
    - c. USG Corporation; Drywall Suspension System.

## 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

## 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
  - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
  - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
  - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

## 3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.



1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
  2. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
  3. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
  5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
  6. Curved Partitions:
    - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.
- E. Direct Furring:
1. Screw to wood framing.
  2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

## 3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Hangers: 48 inches (1219 mm) o.c.
  - 2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
  - 3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of unistrut or equivalent devices.
  - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 5. Do not attach hangers to steel roof deck.
  - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  - 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
  - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

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**SECTION 092220 – ACOUSTICAL INSULATION**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Provide materials, fabrications and installation of acoustical insulation and associated accessories.

## 1.2 SUBMITTALS

- A. Comply with requirements of Section 013300 – Submittal Procedures.
- B. Manufacturer's product data and literature describing each type of insulation.

## 1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Insulation shall be certified by the manufacturer to comply with California standards for insulating materials.
  - 2. Insulating materials shall be installed in compliance with Flame Spread Rating and Smoke Density requirements of IBC.
- B. Fire Performance Characteristics: Provide insulation materials whose fire performance characteristics have been determined per the ASTM test method indicated below. Identify products with appropriate markings of applicable testing and inspecting organization.
  - 1. Surface Burning Characteristic: ASTM E84
  - 2. Fire Resistance Ratings: ASTM E119
  - 3. Combustion Characteristics: ASTM E136
- C. Single Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Section 016000 – Product Requirements.
- B. Deliver and store packaged materials in original containers bearing identification of manufacturer's name, thermal resistance rating, and fiber materials. Maintain seals unbroken and labels intact until time of use.
- C. Keep materials dry by storing off ground under watertight covers.

## 1.6 PROJECT CONDITIONS

- A. Comply with requirements of Section 013100 – Project Management and Coordination.
- B. Do not install insulation until construction has progressed to a point that inclement weather will not damage or wet insulation.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Acoustical Insulation: Unfaced, friction-fit, flexible sound attenuation batt of fiberglass.
  - 1. Provide thermal resistance rating of R-13, Unless otherwise shown.
  - 2. Comply with requirements of ASTM C 665-84, Type I.
  - 3. Manufacturers: Owens-Corning Fiberglass Corp. "Unfaced Fiberglass Insulation, "Schuller- "Unfaced Fiberglass Insulation" or Certainteed Products Corp. "Rigid Fit Unfaced Fiberglass Insulation."

### 2.2 ACCESSORIES

- A. Electrical Box Acoustical Sealer: Resilient sealer pads; "Electrical Box Pads" manufactured by 3M, or approved equivalent.
- B. Insulation Support: String wire, staples, nails as required.
- C. Stick Fasteners: Rust-resistant metal fasteners and washers adhesively applied to substrate. Stic-Klip Mfg. Co. "Type A or N" with Speed Washers or Miracle Adhesives Corp. "Stuk-Ups, Prong or Spindle and Washer".
- D. Adhesive for Stick Fasteners: Type as recommended by fastener manufacturer.
- E. Sealing Tape: Type as recommended by the thermal insulation manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive insulation for conditions that will adversely affect installation and performance.
- B. Do not start work until defects have been corrected.
- C. Coordination: Ensure that all work that will be concealed by the work of this Section, such as electrical and plumbing work, that require inspection, have received all required inspections and been accepted by the inspecting authority.

### 3.2 INSTALLATION OF INSULATION

#### A. General Requirements:

1. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.
2. Install insulation to fit snugly between framing members and around pipes, conduits, and outlet boxes as necessary to maintain integrity of insulation.
3. Provide means to prevent displacement where required.

#### B. Acoustical Insulation:

1. Fill spaces between studs with acoustical insulation.
2. Cover rear surface of all recessed mechanical and electrical outlet boxes with outlet box acoustical isolation pad.

### 3.3 DEFECTIVE WORK

- A. Remove any wet insulation or material deemed defective by the Architect and replace with new material.
- B. Restore other work to original condition which was damaged by repair or replacement of defective insulation work.
- C. Remove damaged materials from project.

### 3.4 PROTECTION

- A. General: Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

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**SECTION 092900 – GYPSUM BOARD**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Work Included: Provide and Install gypsum board panels and cementitious panels, complete as shown, including finishing materials and accessories.
1. Interior gypsum board walls, ceilings and soffits:
    - a. Fire/smoke-rated assemblies.
    - b. Acoustic assemblies.
    - c. Water-resistant assemblies.
    - d. Impact-resistant gypsum board wall assemblies.
    - e. General wall assemblies, including multi-layer assemblies to facilitate reveals and other decorative features.
    - f. Cementitious backer board for interior tile assemblies.
  2. Interior finishing materials and accessories:
    - a. Tapes, joint treatments, and coating materials to prepare wall surfaces for painting by others.
    - b. Corner beads, reveals, and other trims.
    - c. Neoprene tapes for sealing to work by others.
    - d. Fasteners, adhesives and sealants.
    - e. Special trim and accessories.
- B. Work Specified Elsewhere:
1. Section 092216 – Non-Structural Metal Framing.
  2. Section 099123 – Interior Painting.

## 1.2 SUBMITTALS

- A. Comply with requirements of Section 013300 – Submittal Procedures.
- B. Provide manufacturers' data describing products and installations.

## 1.3 QUALITY ASSURANCE

- A. Comply with the latest edition of the following standards:
1. American Society for Testing and Materials ASTM C 840, Standard Specification for Application and Finishing of Gypsum Board.
  2. Gypsum Association (GA) File Numbers in GA-600 Fire Resistance Design Manual.
- B. Fire rated gypsum board systems shall satisfy minimum fire ratings as noted and shall conform to methods approved by applicable Building Code.
- C. Tolerances of Installed Trims and Accessories:
1. Horizontal Variation from Level: 1/8-inch in 12 feet.

2. Vertical Variation from Plumb: 1/8-inch in 8 feet.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Comply with requirements of Section 016000 – Product Requirements.
- B. Deliver materials to the project site with manufacturers' labels intact and legible.
- C. Keep materials dry by storing inside building and fully protect from weather.
- D. Stack gypsum board neatly and flat, with care to avoid damage to edges, ends and surfaces.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Establish and maintain application and finishing environment in accordance with ASTM C 840.
- B. Provide adequate ventilation to eliminate excessive moisture within building during this work.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS - INTERIOR APPLICATIONS

- A. Interior Gypsum Board: Use 5/8-inch-thick, Type 'X' gypsum board throughout, unless otherwise noted.
  1. Typical Finish Board, use throughout unless otherwise noted. ASTM C 36, Type X; tapered, or beveled taper edge, 48 inches wide by maximum length to minimize number of joints.
  2. Water-Resistant Gypsum Backing Board: Provide USG's Fiberock Brand "Aqua-Tough"; Georgia-Pacific (GP) "DensShield Tile Guard"; or equal; Glass-Mat, Water-Resistant Backing Board through core gypsum board panels per ASTM C 1178, Type FRX-G; tapered, or beveled taper edge, 48 inches wide by maximum length to minimize number of joints.
    - a. Locations: Use at high humidity/moisture locations, including Kitchen and Servery areas.
  3. High Abuse, Impact Resistant Board: Provide National Gypsum Hi-Abuse Kal-Kore, USG's Fiberock Brand "Aqua-Tough"; or equal. 5/8-inch-thick, ASTM C1278, Type X; fiber reinforced gypsum panels; tapered, or beveled taper edge, 48 inches wide by maximum length to minimize number of joints.
    - a. Gypsum core wall panel with additives to enhance surface indentation resistance, and impact resistance of the core and surface with abrasion-resistant paper on front and long edges with heavy liner paper bonded to the back side and conforming to ASTM C36.
    - b. Impact Resistance: No failure after 100 impacts when tested in accordance with ASTM E695, modified.
    - c. Indentation Resistance: Not less than the following loads to

produce the indicated depth of the surface indentation when tested in accordance with ASTM D1037, modified:

- 1) 0.100-inch at 260 pounds.
- 2) 0.200-inch at 524 pounds.

- d. Locations: Cashier and Credit Union.
  4. 1/4-inch Flexible Type: Provide board manufactured to bend to fit tighter radii than specified regular-type gypsum board.
    - a. Provide only at non-rated curved layouts that exceed maximum allowable bending radii of specified standard thickness gypsum board.
    - b. Thickness: 1/4 inch. Provide minimum 2 layer application with staggered joints.
    - c. Long Edges: Tapered.
  5. Early-install/Concealed locations (Contractor Option): Provide Georgia Pacific DensGlass Ultra Shaft and DensAmor Plus in conformance with ASTM D 3273; products inherently mold and mildew resistant for use in shaft walls, concealed locations above finished ceilings, internal layers of multi-layer assemblies and other locations approved by Architect to allow installation before the building enclosure is 100-percent complete.
    - a. Use at Shaft-side of shaft assemblies and any location where early install is required prior to closing in of the building.
- B. Cementitious Backer Board: Per ANSI A108.1; Provide Custom Building Product's "Wonderboard"; USG's "Durock Cement Board"; or equal. Panels of high-density portland cement surface coating on both faces of lightweight portland cement and expanded ceramic aggregate core, nominal 5/8-inch-thick and 3.2 to 3.8 pounds per square foot.
1. General: Provide as shown on Drawings for tile assemblies specified in Section 093000 – Tile. (Typical at all restrooms) At fire-rated wall assemblies and inside faces of exterior walls, apply over gypsum board base layer as shown on Drawings
- C. Interior Joint Finishing Materials:
1. General: Comply with ASTM C 475/C 475M.
  2. Joint Tape:
    - a. Interior Gypsum Wallboard: Paper.
    - b. Tile Backing Panels: As recommended by panel manufacturer.
  3. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
    - a. Prefilling: At open joints, beveled panel edges, and damaged surface areas, use setting-type taping compound.
    - b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound as recommended by the manufacturer to obtain best results from actual project conditions.
      - 1) Use setting-type compound for installing paper-faced metal trim accessories.
    - c. Fill Coat: For second coat, use drying-type, all-purpose compound.

- d. Finish Coat: For third coat, use drying-type, all-purpose compound.
  - e. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
4. Joint Compound for Tile Backing Panels:
- a. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
  - b. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
  - c. Cementitious Backer Units: As recommended by backer unit manufacturer.
- E. Fasteners:
1. Screws: ASTM C 954 or ASTM C 1002 self-drilling and self-tapping steel screws with double-lead thread design as approved by system manufacturer for standard and heavier gauge load bearing steel framing.
  2. Nails: ASTM C 514, annular ring type as approved by system manufacturer.
  3. Staples: Galvanized, as recommended to approved accessory manufacturer.
- F. Metal Backing: Refer to Section 092216 – Non-Structural Metal Framing.
- G. Metal Accessories: ASTM C 1047 Electro-galvanized steel corner beads and trim (casing beads) formed for application of joint cement and manufactured specifically for gypsum board construction, minimum base steel 0.014 inch thick.
- H. Special Trims and Accessories:
1. General: Provide extruded aluminum trims and accessories in conforming to profiles and shapes as shown on Drawings and as specified.
    - a. Provide double-layer gypsum board assemblies at locations shown on Drawings to receive recessed reveal trims.
    - b. Material: Extruded aluminum alloy 6063 T5.
    - c. Manufacturer: Provide products manufactured by Gordon, Fry Reglet Company, Flannery Company, or equal.
    - d. Accessories: For each trim profile noted below, provide factory fabricated where required by layouts shown on Drawings, including:
      - 1) Mitered assemblies for "T-intersections" and "X-intersections".
      - 2) Finished end caps.
  2. Partition "End Cap" Trims: Provide for providing finished ends to gypsum board walls including chemical conversion coating. Typical where gypsum board walls butt mullions of window or window wall assemblies, allowing attachment of partition cap to mullion prior to construction of gypsum board wall.
    - a. Overall Width: Provide width matched to partition assembly, including:

- 1) 4-inch stud walls with 5/8-inch gypsum board each side.
      - 2) 6-inch stud walls with 5/8-inch gypsum board each side.
    - b. Tape/screw Flanges: Nominal 7/8-inch.
    - c. Manufacturer: Provide "910 Series" Final Forms by Gordon or equivalent products manufactured by Fry Reglet Company, Flannery Company, or equal.
  3. Reveal "Top Track" Trim: Provide for top of wall or partial height partition top cap termination where shown on Drawings.
    - a. Reveal Depth: Nominal 5/8-inch for use with 5/8-inch gypsum board panels.
    - b. Reveal Width: As shown on Drawings.
    - c. Overall Width: Provide width matched to partition assembly, including:
      - 1) 4-inch stud walls with 5/8-inch gypsum board each side.
      - 2) 6-inch stud walls with 5/8-inch gypsum board each side.
    - d. Tape/screw Flanges: Nominal 7/8-inch.
    - e. Manufacturer: Provide "922 Series" Final Forms by Gordon or equivalent products manufactured by Fry Reglet Company, Flannery Company, or equal.
  4. Reveal "Field" Trims: Provide for creating square-edged vertical and horizontal reveal lines in gypsum board wall assemblies where shown on Drawings.
    - a. Depth: Nominal 5/8-inch for use with 5/8-inch gypsum board panels.
    - b. Reveal Width: As shown on Drawings.
    - c. Tape/screw Flanges: Nominal 7/8-inch.
    - d. Manufacturer: Provide "500 Series" double-sided Final Forms reveals by Gordon or equivalent products manufactured by Fry Reglet Company, Flannery Company, or equal.
  5. Reveal "Edge" Trim: Provide for finished vertical and horizontal reveal edges at top and sides of gypsum board panels where shown on Drawings.
    - a. Reveal Depth: Nominal 5/8-inch for use with 5/8-inch gypsum board panels.
    - b. Reveal Width: As shown on Drawings.
    - c. Tape/screw Flanges: Nominal 7/8-inch.
    - d. Manufacturer: Provide "200 Series" Final Forms by Gordon or equivalent products manufactured by Fry Reglet Company, Flannery Company, or equal.
  6. Reveal "Base" Trim: Provide for recessed base at bottom of gypsum board panels at floor where shown on Drawings.
    - a. Reveal Depth: Nominal 5/8-inch for use with 5/8-inch gypsum board panels.
    - b. Reveal Width: 4-inches.
    - c. Tape/screw Flanges: Nominal 7/8-inch.
    - d. Manufacturer: Provide "800 Series" Final Forms by Gordon or equivalent products manufactured by Fry Reglet Company, Flannery Company, or equal.
  7. Special Fabrications: Provide factory fabricated mitered assemblies for "T-intersections" and "X-intersections" where shown on Drawings.
  8. Finish: Special trims to be primed and painted to match adjacent wall surfaces as specified in Section 099123 – Interior Painting.
- I. Adhesive for Laminating Board: As recommended by approved board

manufacturer.

- J. Acoustical Sealant: As specified in Section 079200 – Joint Sealants.
- K. Electrical Box Sealer:
  - 1. Non-rated Locations: As specified in Section 079200 – Joint Sealants.
  - 2. Fire-rated Locations: As specified in Section 078413 – Penetration Firestopping.
- L. Concealed, Non-Rated Access Panels: As specified in Section 08310 – Access Panels.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Inspect areas and surfaces scheduled to receive gypsum board and verify that:
  - 1. Support systems are in proper alignment, straight and true.
  - 2. Required blocking, bracing and backing members of support systems are installed.
- B. Do not start work until unsatisfactory conditions are corrected.

#### 3.2 PREPARATION

- A. Coordinate details with other work supporting, adjoining, or fastening to gypsum board.

#### 3.4 INSTALLATION - INTERIOR GYPSUM BOARD

- A. General Requirements:
  - 1. Apply and finish gypsum board in accordance with requirements of ASTM C 840 unless otherwise noted.
  - 2. Cut gypsum board by scoring and breaking or sawing from face side. Smooth all cut edges and ends of gypsum board where necessary, in order to obtain neat jointing.
  - 3. Scribe ceiling board neatly in casing bead where it meets surfaces in other planes.
  - 4. Apply first to the ceiling at right angles to framing members, then to walls. Use boards of maximum practical length so that a minimum number of end joints occur.
  - 5. Apply in either vertical or horizontal direction with ends and edges falling on framing members or other solid backing except where edge joints are at right angles to support. Bring ends and edges into contact with adjoining board, but do not force into place.
  - 6. Lay out joints at openings so that no end joint aligns with edges of opening unless control joints will be installed at these points.

- a. All joints running parallel to framing shall be centered as near as possible on face of framing member.
  - b. Stagger end joints and arrange joints on opposite sides of partition to occur on different studs.
  - c. At external corners, butt and fit board to provide solid edge.
7. Hold gypsum board nominal 1/4-inch above floor or curb typical.
  8. Where gypsum board is carried full height to structure above, provide for deflection of structure by undercutting board nominal 3/8 inch and seal top edge of board to structure in continuous bead to form elastic closure.
  9. Cut board to fit electrical outlets, pipes, or other items as required.
    - a. Cut gypsum board by scoring on face and back in outline before removal or by cutting with a saw or other suitable tool.
    - b. Smooth all cut out where necessary.
  10. After trim is applied and prior to decoration, correct surface damage and defects.
  11. Provide gypsum backer board gusset at double stud walls where studs are less than 3-5/8 inches thick.
  12. Fastening:
    - a. Attach board from center to edges and ends, pressing firmly against supports. Place fasteners approximately not more than 1 inch nor less than 3/8 inch from edges with heads just below gypsum board surfaces; but do not break paper.
    - b. Walls: Space screws maximum 12 inches on center for ceilings and maximum 16 inches on center for walls in field and along abutting edges.
    - c. Suspended Ceilings: Space screws maximum 12 inches on center in field and along abutting edges.
- B. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
  2. 1/4-inch Board Application: For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.
    - a. Continue double layer 1/4-inch board application to closest adjacent inside or outside corners. Do not "shim" double board to align with adjacent 5/8 thick gypsum board.
  3. Fire-rated Assemblies: Provide in strict conformance with referenced UL-listed assembly. Use on standard thickness type "X" board bent per manufacturer's written instructions.
- C. Joint Treatment:
1. Apply tape and cement to joints and corners in strict accordance with directions of gypsum board manufacturer.
  2. Pre-fill V-grooves formed by the abutting beveled or rounded wrapped edges with joint compound as per manufacturing recommendations.
  3. Use tape and cement, allow to dry between coats. Use number of coats required by level of finish specified.
  4. Work final coat to smooth level plane surface.

5. Protect external corners with metal corner beads unless otherwise noted.
  6. Treat fastening head dimples same as joints; tape may be omitted.
  7. Joints and fastening head dimples in backer board need only be treated as required to preserve fire rating.
  8. Seal joints shown on Drawings and where gypsum board meets dissimilar material with specified sealant. Tool to neat surface, ready for paint; remove excess material.
- D. Fire-Rated Conditions:
1. At penetrations of rated assemblies, preserve continuity of fire rating with firestopping systems as specified in Section 07840 – Firestopping and Smoke Seals.
  2. Where adjacent interior spaces have suspended ceilings of different heights, extend separating partition finish on both faces of studs to at least 3 inches above higher ceiling finish.
  3. Conform to applicable codes and authorities for requirements of taping and cementing joints and fastener heads.
- E. Sound Retardant Partitions:
1. Construct partitions in accordance with Drawings and as herein specified.
  2. Hold face layers and base layers 1/4 inch clear from abutting surfaces, floors, walls and overhead structure. Seal with specified sealant and tape. Tape not required at floors.
  3. Provide airtight closures at wall penetrations (outlet boxes, pipes, duct work and other items) by neatly cutting gypsum board to clear penetrations. Seal void with specified sealant and apply joint tape to both gypsum board and penetrating object.
  4. Seal airtight the backs and sides of electrical junction boxes with resilient sealer pads.
- F. Furring over Recessed Light Fixtures: At non-rated lighting fixtures, construct furring from gypsum board as indicated on Drawings.
- G. Water-Resistant Board: During board application, coat all cut edges with approved water resistant adhesive as recommended by manufacturer for the application.
- H. Enclosure System: Install in strict accordance with requirements of approved manufacturer's system using metal components, gypsum components, and other accessories as required.
- I. Cementitious Backer Board:
1. General: Install cementitious backer board in strict conformance with the requirements of the tile assemblies specified in Section 093000 – Tile.
  2. Provide support systems so that all edges of cementitious backer boards are supported.
  3. Use only corrosion-resistant fasteners.

### 3.5 FINISHING INTERIOR GYPSUM BOARD ASSEMBLIES



- A. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per USG "Gypsum Construction Handbook, Centennial Edition".
1. Level 1: for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.
  2. Level 2: where water-resistant gypsum backing board panels form substrates for tile, and where indicated.
  3. Level 3: not used.
  4. Level 4: Typical, for all gypsum board surfaces unless otherwise indicated.
  5. Level 5: for gypsum board surfaces, at specific locations shown on Drawings or as required for specified finishes, including:
    - a. All curved Gypsum Board Wall assemblies.
    - b. Surfaces scheduled to receive multi-color paint finishes as specified in Section 099123 – Interior Painting when recommended by the finish manufacturer.
    - c. Other locations as shown on Drawings.
- B. Level 4 gypsum board finish: Embed tape in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration. Use the following joint compound combination:
1. Embedding and First Coat: Ready-mixed, drying-type, all-purpose or taping compound.
  2. Fill (Second) Coat: Ready-mixed, drying-type, all-purpose or topping compound.
  3. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.
- C. Where Level 5 gypsum board finish is indicated: apply joint compound combination specified for Level 4 plus a thin, uniform skim coat of joint compound over entire surface.
1. Use joint compound specified for the finish (third coat) or a product specially formulated for this purpose and acceptable to gypsum board manufacturer.
  2. Produce surfaces free of tool marks and ridges ready for decoration of type indicated.
- D. Where Level 2 gypsum board finish is indicated, apply joint specified for first coat in addition to embedding coat.
- E. Where Level 1 gypsum board finish is indicated, apply joint compound specified for embedding coat.
- F. Finish water-resistant gypsum backing board forming base for mortar-set ceramic tile to comply with ASTM C 840 and board manufacturer's directions for treatment of joints behind tile.
- G. Impact-Resistant Gypsum Board:

1. Construct partitions in accordance with Drawings and as herein specified.
2. General: Install to a height of no less than 4 feet above finish floor at locations shown on Drawings.

3.6 CLEANING AND PROTECTION

- A. Remedy any fastener popping or ridging.
- B. Promptly remove any residual joint compound from adjacent surfaces.
- C. Provide final protection and maintain conditions, in a manner suitable to Installer, that ensures gypsum board assemblies remain without damage or deterioration at time of Substantial Completion.

END OF SECTION

**SECTION 093000 - TILING**

## 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 the following:

- 1. Ceramic and Porcelain Tile.

- B. Related Sections include the following:

- 1. Division 9 Section "Gypsum Board " for cementitious backer board installed in gypsum wallboard assemblies.

## 1.3 DEFINITIONS

- A. Facial Dimension: Nominal tile size as defined in ANSI A137.1.
- B. Installation products: ANSI A118
- C. Installation procedures ANSI 108

## 1.4 SUBMITTALS

- A. Product Data: For each type of tile, mortar, grout, and other products specified.
- B. Shop Drawings: Show locations for each type of tile and tile pattern.
- C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples and accessories involving color selection.

## 1.5 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
  - 1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

#### 1.8 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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

#### 2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.
- B. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
  - 1. Provide Architect's selections from manufacturer's full range of colors, textures, and patterns for products of type indicated. Several colors may be used as indicated on the drawings.

## 2.3 TILE PRODUCTS

### A. Manufacturers:

1. Crosville, Inc.
2. Daltilo

### B. Porcelain Wall Tile:

1. Composition: Porcelain stone collection - Notorious
2. Module Size: 12-inches x 12-inches and 12-inches x 24-inches
3. Nominal Thickness: 10.5mm
4. Color: NTR01 – Femme Fatal and Leading Man,

### C. Porcelain Floor and Base Tile:

1. Composition: Porcelain stone collection - Notorious
2. Module Size: 12-inches x 12-inches and 6-inches x 12-inches
3. Nominal Thickness: 10.5mm
4. Color: NTR05 – Leading Man,

### D. Ceramic Floor, Wall and Base Tile:

1. Basis of Design: match existing LDRP restrooms
2. Coordinate exact product style, model and color with owner prior to purchase.

## 2.4 THRESHOLDS

### A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch or less, and finish bevel to match face of threshold.
2. Solid Surface Thresholds: Provide solid surface thresholds fabricated by Corian.

## 2.5 WATERPROOFING:

### A. Waterproof and Crack Isolation Membrane:

1. General: Sheet Membrane: ANSI A118.10; composite sheet membrane made from an alloy of non-plasticized Chlorinated Polyethylene (CPE) with non-woven fiber laminated to both sides.
2. Manufacturer: Noble Company, Product: NobleSeal TS.

### B. Performance:

1. 1. Water Vapor Permeance: ASTM E96/E96M, Procedure E; maximum 0.15 perms (28.6 ng/Pa•s•m<sup>2</sup>).

2. Crack Isolation: "High performance" rating when tested to the "System Crack Resistance" portion of ANSI A118.12.

C. Accessories:

1. Bonding Mortar:
  - a. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
2. Bonding Adhesive: Type recommended by sheet membrane manufacturer to suit application.
  - a. Basis of Design Product: NobleBond 21.
3. Mortar Bed:
  - a. Portland Cement Mortar (Thickset): ANSI A108.02.
4. Seam Sealant: Type recommended by sheet membrane manufacturer
  - a. Basis of Design Product: NobleWeld 150.
5. Perimeter Sealant: Type recommended by sheet membrane manufacturer

2.6 MORTAR MATERIALS - THICK SET BEDS

- A. Portland Cement Mortar; Thick-Set: Description: Site mix of Portland cement, sand and water as specified.
- B. Portland Cement With Latex Additive; Thick-Set:
  1. Portland Cement: ASTM C150, Type I, from one source only, non-staining and non-air-entraining.
  2. Supplemental cementitious materials derived from coal fired power plant wastes shall not have a mercury content >5.5ppb.
  3. Fly ash shall not be a byproduct of municipal solid waste incinerators
  4. Mortar Sand: ASTM C144, free of deleterious materials, well graded.
  5. Setting Bed Sand: ASTM C136, 100 percent passing No. 4 sieve.
  6. Latex Additive:
    - a. Description: Latex additive serving as replacement for gaging water, for use with site mixed portland cement mortar.
    - b. Quantity: As recommended by latex additive manufacturer to produce workable consistency.
    - c. Acceptable Products:
      - 1) CustomFloat Bedding Mortar mixed with Acrylic Mortar Admix 1:1 water by Custom Building Products.
      - 2) 3701 Mortar Admix by Laticrete.
      - 3) Planicrete 50 by Mapei.

2.7 MORTAR MATERIALS - THIN SET BEDS

- C. Portland Cement with Latex Additive; Thin-Set:
  1. Description: Latex additive and site mixed Portland Cement mortar. Complying with ANSI-A118.4.
  2. Quantity: As recommended by latex additive manufacturer.
  3. Acceptable Products:

- a. CustomCrete Latex Mortar Admix with site mixed Mortar or CreteMix Mortar by Custom Building Products.
  - b. 4237 Latex Thin set Mortar Additive by Laticrete.
  - c. Keracrete System consisting of KER 303 Latex mixed with 1:1 sand/cement blend by Mapei.
4. For all glass tile and glass and stone mixed tile throughout use: Mapei Adesilex P10 bright white grout. Flatten trowel ridges prior to setting glass tiles.

## 2.8 EPOXY ADHESIVES

- D. Multi-component, factory prepared, 100 percent epoxy resin and hardener with sand or mineral filler material.
- E. Comply with ANSI A118.3 for thin-set applications for chemical resistant, water cleanable quarry tile installations.
- F. Acceptable Products:
  1. 100% Solids Epoxy Mortar by Custom Building Products.
  2. Latapoxy 300 Epoxy Adhesive by Laticrete.
  3. Kerapoxy 410 Chemical Resistant Epoxy Mortar by Mapei.

## 2.9 GROUT

- G. Epoxy Grout for Floor Tile:
  1. Multi-component, factory prepared, 100 percent epoxy resin and hardener with sand or mineral filler material.
  2. Comply with ANSI A118.3.
  3. Color: To be selected.
  4. Acceptable Products:
    - a. Kerapoxy Chemical Resistant Grout by Mapei.
- H. Unsanded Latex – Modified Grout for Wall Tiles
  1. Description: Latex modified, factory blended. Mildew resistant, non-sanded consisting of Portland cement and additives: comply with ANSI A118.6
  2. Latex Additive: Type as recommended by latex mortar manufacturer.
  3. Color: To be selected
  4. Acceptable Products:
    - a. KER 800 polymer-modified unsanded grout by Mapei

## 2.11 ELASTOMERIC SEALANTS

- a. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics required.
- b. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

### 1) Products:

- a) Bostik; Chem-Calk 550.
- b) Mameco International, Inc.; Vulkem 245.
- c) Tremco, Inc.; THC-900.

## 2.12 TILE BACKING

- c. Cementitious Backer Units: for use in lieu of a Portland cement mortar bed. Must meet ANSI A118.9 and ASTM C 1325 for product specification and ANSI A108.11 for installation methods.
- d. Fiber Cement Underlayment: Must meet ASTM C 1288 for product specification and ANSI A108.11 for installation methods.

## 2.13 MISCELLANEOUS MATERIALS

- e. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- f. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- g. Grout Sealer: Manufacturer's standard product for sealing grout joints that does not change color or appearance of grout. Provide at all grout applications as required by grout manufacturer.
- h. Edge protection and transition: for finishing outside edges of tiled wall corners or transitions to another material. Typical at all tile applications.
  - 1) Schluter Rondec or Jolly as required. Choose from manufacturers full line of colors.

## 2.13 MIXING MORTARS AND GROUT

- a. Use urethane based grout for stone and glass mosaic tiles applications at walls conforming to ISO 13007 R2 and ISO 13007 RG Enzyme resistant formula, respectively.
- b. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- c. Add materials, water, and additives in accurate proportions.
- d. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## PART 2 - EXECUTION

### 1. EXAMINATION

- a. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
  - 1) Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
  - 2) Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
  - 3) Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.



- b. Proceed with installation only after unsatisfactory conditions have been corrected.
2. PREPARATION
- a. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
  - b. Provide concrete substrates for tile floors installed with adhesives or thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
    - 1) Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
    - 2) Remove protrusions, bumps, and ridges by sanding or grinding.
3. INSTALLATION, GENERAL
- a. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
  - b. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
  - c. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
  - d. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
  - e. Jointing Pattern: Lay tile in patterns as shown in construction documents. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
  - f. Lay out tile wainscots to next full tile beyond dimensions indicated.
  - g. Use crack isolation mat where poured gypsum is used for leveling.
  - h. Grout tile to comply with requirements of the following tile installation standards:  
For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.  
Epoxy/Resin-Based Grout: ISO 13007 RG 100%-solid epoxy grout, with high chemical, stain, and enzymatic.
4. WATERPROOFING INSTALLATION

- a. If membrane is not wide enough, seam by overlapping sheets minimum 2 inches (50 mm), shingle fashion in direction of water drainage. Seal joints watertight.
  - b. Turn sheet membrane installed on floors up vertical surfaces minimum 18 inches (50 mm) higher than flood plane and bond to substrate.
    - 1) Shower Walls: Extended sheet membrane for the full height of the wall.
  - c. Extend sheet membrane over floor drains. Cut drain opening in sheet membrane and seal to drain body. Secure membrane with floor drain clamping ring. Seal sheet membrane watertight to items penetrating sheet membrane.
  - d. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.
  - e. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
  - f. Flood test waterproof membranes for 72 hours after fully cured
5. WALL TILE INSTALLATION
- a. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.
  - b. Joint Widths: Install tile on walls with the following joint widths: refer to installation guidelines for grout joint recommendations at each type of tile.
6. CLEANING AND PROTECTING
- a. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
    - 1) Remove grout residue from tile as soon as possible.
    - 2) Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
  - b. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

END OF SECTION

**SECTION 095113 – ACOUSTICAL PANEL CEILINGS**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Work Included: Provide and install acoustical ceilings panels and accessories, complete, as shown and specified, including:
  - 1. Mineral core acoustical ceiling panels.
- B. Work Specified Elsewhere:
  - 1. Section 092216 – Non-Structural Metal Framing.
  - 2. Division 23 – Mechanical (Air Supply, Ducts, and Connections).
  - 3. Division 26 – Electrical (Lighting Fixture Attachments).

## 1.2 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM):
  - 1. C635; Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
  - 2. C636; Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- B. Ceiling and Interior System Contractors Association (CISCA):
  - 1. Ceiling Systems Handbook.

## 1.3 SYSTEM DESCRIPTION

- A. Performance Criteria:
  - 1. Fire-Hazard Classification: Provide acoustical ceilings that are identical to those tested for following fire hazard characteristics, per ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities have jurisdiction. Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
    - a. Test Method: ASTM E84.
    - b. Flame Spread: 25 or less.
    - c. Smoke Developed: 50 or less.

## 1.4 SUBMITTALS

- A. Comply with requirements of Section 013300 – Submittal Procedures.
- B. Product Data: Manufacturer's specifications, data, and installation instructions.

- C. Shop Drawings:
1. Coordination Drawings: Reflected ceiling plans drawn accurately to scale and coordinating penetrations and ceiling-mounted items. Show following:
    - a. Ceiling suspension members.
    - b. Method of attaching hangers to building structure.
    - c. Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinkler heads; and special moldings at walls, column penetrations, and other junctures with adjoining construction.
- D. Samples:
1. For Initial Selection: Manufacturer's standard sample sets consisting of actual acoustical units or sections of units showing full range of colors, textures, and patterns available for each type of unit indicated.
  2. For Verification: 12-inch-square sample of each type of exposed finish specified or selected and of same thickness and material indicated for final unit of Work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.
- E. Qualification Data: For firms and persons specified in Quality Assurance article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.
- F. Research Reports: Or evaluation reports of model code organization acceptable to authorities having jurisdiction that show compliance of acoustical ceiling system and components with building code in effect for Project.
- G. Product Test Reports: From qualified independent testing agencies that are based on its testing or current products for compliance of acoustical ceiling systems and components with requirements.

## 1.5 QUALITY ASSURANCE

- A. Qualifications of Installer: Engage experienced Installer who has successfully completed acoustical ceilings similar in material, design, and extent to those indicated for Project.
- B. Single-Source Responsibility: Obtain each type of acoustical ceiling unit from single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of Work.
- C. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any).

### 1.7 PRODUCT HANDLING

- A. Delivery and Storage: Deliver acoustical ceiling units to Project site in original, unopened packages and store them in fully enclosed space protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Handling: Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

### 1.8 PROJECT CONDITIONS

- A. Storage: Before installing acoustical ceiling units, permit them to reach room temperature and stabilized moisture content.
- B. Space Enclosure: Do not install acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those expected for final occupancy.

## PART 2 - PRODUCTS

### 2.1 MINERAL CORE ACOUSTICAL PANELS

- A. Manufacturer: Provide products manufactured by Armstrong World Industries; USG; or equal.
  - 1. Basis-of-Design: Armstrong Ultima Health Zone 1938 products are specified as the basis of design. Field Verify to match existing.
- B. Acoustical Panel Types:
  - 1. Smooth, clean, durable finish – impact, scratch, and soil resistant. USDA Certified biobased product, 95%. Wet-formed mineral fiber with DuraBrite acoustically transparent water-repellent membrane.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Examine substrates and structural framing to which ceiling system attached or abuts, with Installer present, for compliance with requirements specified in this and other sections that affect installation and anchorage of ceiling system. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install acoustical ceiling systems per Reference Standards and manufacturer's instructions.
- B. Acoustical Ceiling Tiles:
  - 1. General: Make joints straight and true to line with exposed surfaces flush and level. Tightly butt tiles with corners and arises full and without broken edges.
  - 2. Suspended System:
    - a. Concealed Grid: Install tile with concealed metal splines in kerfed edges between tiles to form concealed mechanical joints.
    - b. Edge Units: Install spring steel spacers where supported on edge trim.
    - c. Access Tile: Install units by concealed saddle and notched hook spline method.
    - d. Identification Markers: Install one per access tile; locate on tile as directed.

### 3.3 CLEANING

- A. Cleaning: Clean exposed surfaces of acoustical ceiling panels. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

**SECTION 096100 – MOISTURE VAPOR EMISSION CONTROL**

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pre-formed moisture suppression membrane installed over concrete subfloor as a floor covering underlayment

1.2 RELATED SECTIONS

- A. Section 096519 – Resilient Flooring

1.3 REFERENCES

- A. ASTM International (ASTM):
  1. ASTM D2646-05- Standard test Methods for Backing Fabric Characteristics of Pile Yarn Floor Coverings.
  2. ASTM G31-15- Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
  3. ASTM D5197 – 09e1 – Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology).
  4. ASTM D5729-97 (2004)e1 – Standard Test Method for Thickness of Nonwoven Fabrics.
  5. ASTM E96-05 – Standard Test Methods for Water Vapor Transmission of Materials.
  6. ASTM F710 – Standard Practice Preparing Concrete Floors.
  7. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

1.4 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Manufacturer's data indicating product physical characteristics, performance criteria, and limitations of use, including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- C. Warranty Registration: Manufacturer's warranty registration with concrete subfloor moisture test results and building ambient air temperature and relative humidity test results.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2 year experience installing similar products.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish area designated by Architect.
  - 2. Do not proceed with remaining work until workmanship is approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.

## 1.6 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to starting work of this section.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.

## 1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 1.9 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

## 1.10 COORDINATION

- A. Coordinate the work of this section and directly related sections with concrete floor construction and repair.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Schonox – A Sika Brand: [schonox.com](http://schonox.com)



## 2.2 MOISTURE SUPPRESSION SYSTEM FOR FLOORING PRODUCTS

- A. Product: Schonox EPA 2-part epoxy moisture mitigation system.
  - 1. Material: Free-standing, dimensionally stable, 4-ply composite product, engineered as a moisture suppression membrane to be used on concrete floors where high moisture exists.
  - 2. Dimensions: 144 feet long by 5 feet wide (43.9 m by 1.52 m) standard roll.
  - 3. Mold, Mildew and Fungal Resistance, ASTM G21: Passed
  - 4. Moisture Vapor Transmission rate, ASTM E96: Less than 0.01 g/hr/ sq m

## 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.
- C. Concrete Subfloor:
  - 1. Verify internal RH of the concrete according to ASTM F-2170.
  - 2. Record readings and submit with manufacturer's warranty registration.
  - 3. Do not install VersaShield MBX if relative humidity levels within the concrete exceed 99.5% RH.

### 3.2 PREPARATION

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

### 3.3 PREPARATION

- A. Concrete Sub Floor:
  - 1. Prepare floor according to manufacturer's instructions including removal of existing materials on concrete surface, grinding protrusions flat, and filling low spots with water-resistant cementitious patching or leveling compound. Patch cracks greater than 1/8 inch (3.2 mm) width using manufacturer's approved crack mending compound.
  - 2. Remove debris and excessive dust from the surface.

### 3.4 UNDERLAYMENT INSTALLATION

- A. Install underlayment in all areas where new slab on grade is applied as well as on existing slab on grade where new finishes are called out.

- B. Install in accordance with manufacturer's instructions.
- C. Install moisture suppression membrane with smooth film side facing concrete slab.
- D. Install in accordance with membrane manufacturer's current written installation instructions.
  - 1. Install in accordance with membrane manufacturer's current **3' x 2'-6" Box Grid** installation instructions.
- E. If any jobsite condition interferes with compliance with manufacturer's instructions, contact manufacturer and obtain written job-specific procedures. Notify Architect or Owner's representative describing the interfering jobsite condition and manufacturer's job-specific instructions.

### 3.5 FLOORING INSTALLATION

- A. Adhesives: Apply adhesive to mineral-coated surface of moisture suppression membrane. Use only water-based, non-porous adhesives. Do not use solvent-based adhesives.
- B. Protection: Protect moisture suppression membrane from damage during flooring installation. Do not tear, rip, puncture, or delaminate membrane when applying trowel-on adhesive. Repair damaged areas according to membrane manufacturer's instructions before flooring installation. Provide continuous, intact moisture suppression membrane under entire designated flooring area.
- C. Sheet Vinyl/LVT: Adhere directly to VersaShield MBX only. Installation requires review by Halex Technical Services prior to installation. Call (800) 576-1636 to get Job Specification warranty form and installation instructions.

### 3.6 PROTECTION

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

END OF SECTION

**SECTION 096519 – RESILIENT FLOORING**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Work Included: Provide and install resilient flooring, resilient base and accessories, complete as shown on Drawings and as specified, including:
1. Luxury Vinyl Tile and Luxury Vinyl Plank
  2. Homogeneous sheet vinyl, heat welded including integral coved base.
  3. Heterogeneous Sheet Flooring
  4. Resilient Base at sealed concrete floors.
  5. Edge Strips, Reducer Strips and other floor-edge transitions.
  6. Cap trim, cove-shaped furring, and accessories for cove base installations.
  7. Hot Weld Strips and cold seam materials.
  8. Adhesives and other accessory materials as required to provide complete floor assemblies as specified.
- B. Work Specified Elsewhere:
1. Section 035300 – Concrete Toppings.
  2. Section 087100 – Door Hardware.
  3. Section 093000 – Tile.

## 1.2 REFERENCE STANDARDS

- A. Resilient Floor Covering Institute (RFCI).
- B. American Society for Testing and Materials (ASTM):
1. ASTM E-1907-98: "Standard Practices for Determining Moisture-Related Acceptability of Concrete Floors to Receive Moisture-Sensitive Finishes".
  2. ASTM F-1869-89: "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride".

## 1.3 SUBMITTALS

- A. Comply with requirements of Section 013300 – Submittal Procedures.
- B. General: Schedule submittals as required to provide a minimum of 60-days from flooring materials order day to start of installation.
- C. Shop Drawings: Provide seaming diagrams for public spaces including corridors.
- D. Samples:
1. Edge, Reducer and Transition Strips: Each specified type and color, 12 inches long.

2. Resilient Tile Flooring: 2 samples, each type and color specified, 12 inches square.
  3. Resilient Sheet Flooring: 2 samples, each type and color specified, 12 inches square.
  4. Resilient Base: 2 samples each type and color, 12 inches long. None required for black color.
- E. Product Data: Manufacturer's specifications, data, and installation instructions.
- F. Qualifications: Submit Contractor's and Installer's project lists and specified manufacturer certifications, including project names and addresses and contact names and telephone numbers.
- G. Maintenance Manuals: Manufacturer's written maintenance instructions.

#### 1.4 QUALITY ASSURANCE

- A. Qualifications of Installer: Minimum of three project installations of extent comparable to proposed Project.
- B. Regulatory Requirement: Materials shall have the following flammability ratings, according to NFPA 253:
1. Smoke Density: 45 or less.
  2. Critical Radiant Flux: Class I - Minimum 0.45 watts per square centimeter. (Class II - Minimum 0.22 watts per square centimeter.)
- C. Slip Resistance: Static coefficient of friction for installed flooring shall be equal to or greater than .06 when measured with a James Machine per ASTM D2047.

#### 1.5 PRODUCT HANDLING

- A. Comply with requirements of Section 016000 – Product Requirements.
- B. Delivery: Deliver materials to Project site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color, graining, and design.
- C. Storage: Store materials per manufacturer's recommendations and at not less than 70 degrees F for at least 24 hours before installation.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain temperature in spaces to receive resilient flooring at 70 degrees F minimum at least 48 hours before, during, after installation; thereafter, maintain a 55 degrees F minimum.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Basis-of-Design: Tile Products as scheduled on the Drawings provide a "Basis-of-Design" for each scheduled Resilient Flooring Product and have been selected and approved for use by the Owner based manufacturer's samples provided to the Architect, and have been fully coordinated with finish materials specified elsewhere.
- B. Resilient Flooring substitution requests will only be considered for acceptance by the Architect when the following conditions are met:
  - 1. Proposed substitution Resilient Flooring meets or exceeds the specified material, construction and performance criteria.
  - 2. Proposed Resilient Flooring substitution visually matches scheduled types for thickness, textures, patterns, color, and reflectance and other surface characteristics as determined by the Architect.
  - 3. Acceptance of a proposed substitution Resilient Flooring by the Architect shall incur no additional cost to the Owner, including costs incurred to re-select adjacent finishes specified elsewhere as required to coordinate and match substituted Resilient Flooring for color, texture or pattern.

## 2.2 RESILIENT BASE AND ACCESSORIES

- A. Manufacturer: Provide products manufactured by Mannington.
- B. Adhesive for Resilient Bases: Waterproof type recommended in writing or supplied directly by base manufacturer.
- C. Resilient Base Materials: Thermoplastic Rubber, Type TP- Premium Edge wall base. Finish: Smooth Matte Finish. Corners- Factory pre-formed. Thickness- 1/8"; 4-foot minimum length.
  - 1. Provide colors as scheduled on Drawings and specified and as required to match Architect's samples.
  - 2. Provide manufacturer's standard black at casework bases.
- D. Resilient Base Types:
  - 1. Rubber Wall Base by Mannington
    - a. Color: As scheduled on Drawings.
    - b. Height: 4-inches.
    - c. Seal rubber base to resilient flooring with continuous clear silicon sealant.
- E. Locations: Provide resilient base at locations shown or scheduled on Drawings, including:
  - 1. Exposed, Sealed and Painted Concrete floors.
  - 2. Floors finished with materials specified in this Section.
  - 3. Plywood.

## 2.4 HOMOGENEOUS SHEET VINYL FLOORING

- A. General: Provide PVC-Free Resilient Sheet Flooring in conformance with ASTM F-1303, Type I, Grade 1, Class B Backing, for types, compositions, and other characteristics indicated.
1. Manufacturer: Provide “**BIOSPEC MD**” by **Mannington** Commercial Flooring.
  2. Homogeneous Vinyl Flooring Types:
    - a. As scheduled on Drawings.
- B. Performance Requirements:
1. Fire Resistance: 450 or less when tested per ASTM E-662/NFPA 258 (Smoke Density). 0.45-watts/cm<sup>2</sup> or better (Class 1 or better) when tested per ASTM E-648/NFPA 253 (Critical Radiant Flux).
  2. Static Load Limit: 750-pounds per square inch or better when tested per ASTM F-970.
  3. Slip Resistance: equal or exceed specified requirements.
- C. Homogeneous Sheet Vinyl Flooring Accessories:
1. Adhesive: Provide Solvent-free Adhesives recommended by each Homogeneous Sheet Vinyl Flooring Manufacture in writing for use with each type of specified Homogeneous Sheet Vinyl Flooring and for the actual conditions at the project area.
    - a. Adhesive Trowel: Use appropriate trowel tooth patterns as recommended by the Adhesive Manufacturer in writing for use with the specified Homogeneous Sheet Vinyl Flooring types.
  2. Sub-Floor Primer and Sealer: Provide sub-floor Sealers or Primers where recommended by the Resilient Sheet Flooring Manufacturer(s) in writing where required by the Sub-Floor conditions at the project area at the project area noted during verification of conditions.
  3. Welding Rods: For Homogeneous Sheet Vinyl Flooring shown on Drawings or scheduled to receive heat-welded seams, provide 4-mm welding rod as recommended in writing by the manufacturer of each specified type of Flooring. Provide single-sourcing of welding rods and sheet vinyl flooring for each specified type of Resilient Sheet Flooring.
    - a. Colors: Provide welding rods to match Architect's samples or as selected by Architect from manufacturer's full range of colors.
  4. Homogeneous Sheet Vinyl Flooring Initial Cleaning: Typical at all locations, follow Resilient Sheet Flooring manufacturer's written instructions recommending process and product for each specified type.
    - a. Finish Sheen: to be Matte.

## 2.5 LUXURY VINYL TILES AND PLANK

- A. General: Provide Luxury Vinyl Tiles and Planks in conformance with ASTM F-1700, Class 3, Type B for types, compositions, and other characteristics indicated.
1. Manufacturer:
    - a. Provide a match for existing LVT Commercial Flooring. See finish schedule on drawings.
  2. Luxury Vinyl Tile and Plank Types:
    - a. As scheduled on Drawings.

## B. Performance Requirements:

1. Fire Resistance: 450 or less when tested per ASTM E-662/NFPA 258 (Smoke Density). 0.45-watts/cm<sup>2</sup> or better (Class 1 or better) when tested per ASTM E-648/NFPA 253 (Critical Radiant Flux).
2. Static Load Limit: 750-pounds per square inch or better when tested per ASTM F-970.
3. Slip Resistance: equal or exceed specified requirements.

## C. Luxury Vinyl Tile and Plank Accessories:

1. Adhesive: Provide Solvent-free Adhesives recommended by the Luxury Vinyl Plank Manufacturer(s) in writing for use with each type of specified Vinyl Composition Tile and for the conditions at the project area.
  - a. Adhesive Trowel: Use appropriate trowel tooth patterns as recommended by the Adhesive Manufacturer in writing for use with the specified Luxury Vinyl Plank types.
2. Sub-Floor Primer and Sealer: Provide sub-floor Sealers or Primers where recommended by the Luxury Vinyl Plank Manufacturer(s) in writing where required by the Sub-Floor conditions at the project area at the project area noted during verification of conditions.
3. Luxury Vinyl Plank Sealer: Typical at all locations, provide sealer coat for Luxury Vinyl Plank floors as recommended by each Luxury Vinyl Plank manufacturer in writing for each specified type.
4. Wax for Luxury Vinyl Plank: not recommended.

## 2.6 MATERIALS FOR COVERED BASE AT RESILIENT FLOORS

A. General: Provide materials as required to install cove base at locations shown or scheduled on Drawings. Not all specified resilient sheet flooring types may require cove base; some resilient flooring types may be scheduled to receive several base treatments, including cove base.

## B. Materials:

1. Fillet Cove Strips: Provide redwood cove strips as recommended by each specified resilient sheet flooring manufacturer in writing to coordinate with each specified resilient sheet flooring type.
2. Outside Corner for Resilient Sheet Coved Base: Provide the each specified manufacturer's outside pre-molded corner to match each specified resilient sheet flooring type. Provide types and color(s) as scheduled on Drawings and as specified.
3. Cap Strip: Vinyl cap to be Mercer Mouldings #040 by Mannington. Single-source one cap strip type and finish for use through-out entire scope of project. Provide cap strips in the longest length practical to minimize butt joints. See finish schedule for color. Provide caulking where cap meets wall surfaces.

## 2.7 REDUCER STRIPS, EDGE STRIPS AND TRANSITIONS

A. Manufacturer: Where Manufacturer's standard products are scheduled on Drawings and specified, provide the specific products indicated or materials complying with the requirements set forth in this Section.

- B. Adhesive for reducer, edge and transition strips: Waterproof type recommended in writing or supplied directly by base manufacturer.
- C. Locations: Provide reducer, edge and transition strips at locations where different floor finishes meet, as required to protect the transition joint and/or provide a gentle transition between floor finishes of differing thicknesses, including:
  - 1. Exposed, Sealed and Painted Concrete floors: to any other floor finish.
  - 2. Section 093000 – Tile: to any floor finish specified in this Section and Section 096813 – Tile Carpeting.
  - 3. Floor finishes specified in this Section:
    - a. All locations between two different floor finish materials specified in this Section.
    - b. Between two different floor finish colors of the same material specified in this Section when shown or scheduled on Drawings.
    - c. Between floor finishes specified in this Section and at transitions to carpet specified in Section 096813 – Tile Carpeting.
- D. Manufacturer: Provide reducer, edge and transition strips by Johnsonite, Mercer, or equal.
  - 1. Provide reducer, edge and transition strips at all level differences in flooring. Center on door frame where possible.
    - a. Colors: As selected by the Architect from the manufacturer's full range of standard colors.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Examine substrates and adjoining construction and conditions under which Work will be installed. Give written notification of deficiencies detrimental to proper or timely installation; do not proceed until corrected.
- B. Slab Moisture Test:
  - 1. General: Test substrates to determine acceptable dryness prior to application of resilient flooring. Use ASTM F-1869-89, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride", as applicable for the specified flooring as recommended by resilient flooring manufacturer.
  - 2. Slab-Moisture Content Testing: Perform tests at locations not more than 50 feet apart in every direction, but no less than one test per 1000-square feet. Verify the following performance criteria are equaled or exceeded before beginning floor installation:
    - a. Vapor and moisture barrier shall reduce vapor transmissions from concrete slabs-on-grade and above-grade concrete and metal deck assemblies to 3 pounds or less per 1000-square feet in a 24-hour period when tested per ASTM F-1869-89.
    - b. Alkalinity: Maximum pH of 10.



3. Contingency for High Moisture Readings: Report all unacceptable test results to Architect.
- C. Air-Moisture Content Testing:
1. General: Determine relative humidity of air in rooms to receive resilient flooring, using wet-bulb and dry-bulb sling psychrometer. Do not install resilient flooring when relative humidity exceeds 45 percent.
- D. Adhesion Test:
1. Secure one, three-foot-square piece of each specified type of resilient sheet or 3-foot by 3-foot area of each specified type of tile in each typical area that has passed the specified moisture test, using adhesive(s) as specified and recommended by manufacturer(s).
  2. The test pieces shall remain in place for 72 hours.
  3. Determine if the adhesive is bonding the material satisfactorily to the surface. Resilient flooring should not be able to be removed without severe deformation, tearing, or destruction of the sample(s).
  4. Where there is evidence of unsatisfactory bonding, manufacturer's representative is to be notified in order that they may verify and evaluate the conditions.
  5. Notify Architect immediately if, in the opinion of manufacturer's representative, the adhesion test results are unsatisfactory.
  6. Remove successful test pieces and adhesive prior to commencing final installation.

### 3.2 PREPARATION

- A. Surface Preparation: Clean substrate of deleterious materials which impair bonding of resilient flooring. Do Work on smooth, even troweled finish. Remove rough areas and protrusions from concrete by gridding. Fill cracks, rough areas, and other surface defects with an acceptable plastic filler.
- B. Primer/Sealer Coat: Apply primer to concrete surfaces; work well into surfaces; use minimum quantity that will assure complete surface coverage with a non-absorptive base. Allow primer to thoroughly dry before applying adhesive.
1. Prime coat may be omitted if recommended by resilient flooring manufacturer in writing based on review of the project area. Review the requirements for each specified type of resilient flooring for each project area.
  2. Do not combine different specified flooring types under one manufacturer's recommendation.

### 3.3 INSTALLATION

- A. Edge Strips:
1. General: Install in continuous lengths at door openings and other exposed edges of resilient flooring, unless otherwise shown. Install edge strips before applying primer.
  2. Metal: Anchor strips solidly to substrate with countersunk non-magnetic stainless steel screws; use lead shields for anchoring into concrete;

- space screws 1-inch from each end and not more than 9-inch centers at intermediate points.
3. Vinyl: Set in and securely bond to substrates with adhesive per manufacturer's recommendations.
- B. Prime Coat: Apply primer to concrete surfaces; work well into surfaces; use minimum quantity that will assure complete surface coverage with a non-absorptive base.
1. Allow primer to thoroughly dry before applying adhesive.
  2. Prime coat may be omitted if recommended by resilient flooring manufacturer.
- C. Adhesive: Apply to substrate with properly notched steel trowels; allow adhesive to become tacky before applying resilient flooring.
- D. Resilient Flooring: Extend flooring, and fit neatly and tightly, into breaks and recesses, against bases, around pipes and penetrations, around permanent casework, equipment, and under-casework recesses.
- E. Sheet Material:
1. General: Lay sheet material with minimum number of joints with bottom surface securely bonded to substrate and top surface left smooth, clean, and free from imperfections.
    - a. Make joints straight, tight, and inconspicuous.
    - b. Roll each sheet from center to edges to assure complete bond and tight joints.
  2. Joints: Provide Chemically Weld; Adhesive Weld; Heat Weld as scheduled on Drawings and in conformance with sheet flooring manufacturer's written instructions.
  3. Coved Bases:
    - a. Install a continuous redwood cove strip at intersection of floor and vertical surfaces prior to laying sheet material.
    - b. Use cove strip with a 3/4-inch radius; make bases 4 inches high, unless otherwise shown; butt ends; miter corner; secure with acceptable type fasteners.
    - c. Apply cove strips and sheet material to solid backing.
    - d. Roll sheet material into adhesive; hold in place until complete adhesion is assured.
    - e. Make top of base level and straight; terminate top edge into a metal trim cap.
    - f. Securely screw trim cap to backing before applying sheet material; use single lengths where possible; make neat mitered corners and butted ends.
    - g. Use standard aluminum alloy or stainless steel trim cap of standard design as selected, unless otherwise shown.
  4. Perimeter Bond System: At Contractor's option, a perimeter bond system may be used for installation of sheet vinyl flooring.
    - a. Do work with manufacturer's approved and trained applicators per manufacturer's recommendations and supervision.
    - b. Install sheet vinyl flooring with adhesive spread only at seam lines, projections, and wall lines.
    - c. Cut seams with an electrically operated cutting machine made for purpose.

## F. Resilient Bases:

1. General: Where base is scheduled, install around perimeter of room or space, at base of partitions, walls, columns, pilasters, casework, and other permanent fixtures.
  - a. Install top-set coved type bases throughout, except install straight type bases at carpet.
  - b. Secure bases to surfaces with waterproof adhesive; make joints tight; keep top and bottom edges in firm contact with adjacent surfaces.
    - 1) Provide a continuous seal of the resilient base to both the wall surface at the upper edge and the floor surface at the bottom edge.
  - c. Use longest lengths possible; straight pieces less than 24 inches long not permitted.
  - d. Miter or cope inside corners.
2. Coved Type: Provide with premolded end stops and premolded one-piece external corners.
3. Straight Type: Provide with preformed one-piece external corners.
4. Edges and Seams: Match edges at seams. Double cut adjoining lengths. Make tight butt joints.

## 3.4 CLEANING

- A. General: Not more than four days before Substantial Completion, thoroughly clean work per resilient flooring manufacturer's recommendations. Use of solvents, wet mopping, or washing is prohibited.
- B. Defective and Damaged Work: Replace with acceptable Work at no additional cost to Owner.

## 3.5 PROTECTION

- A. General: Protect Work from traffic during construction period so Work will be without indication of use or damage at time of Substantial Completion.

END OF SECTION

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**SECTION 096813 – CARPET TILE**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Furnish labor, materials, tools, equipment, and services for Carpet Tile (CPTT) in accordance with provisions of the Contract Documents.
- B. Completely coordinate with work of other trades.

## 1.2 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Carpet manufacturer shall have no less than ten (10) years of production experience with carpet similar to type specified in this document; and whose published product literature clearly indicates compliance of products with requirements of this section.
- B. Contractor Qualifications:
  - 1. Firm with not less than five (5) years of successful carpeting experience similar to work of this section and recommended and approved by the carpet manufacturer. Upon request, submit letter from carpet manufacturer stating certification qualifications and acceptance.
- C. Installer Qualifications:
  - 1. Mill trained, skilled mechanics supervised by experienced superintendent with 50,000 yards experience.
- D. Single Source Responsibility:
  - 1. Provide product material by a single manufacturer for each carpet type specified.
- E. Carpet and Rug Institute:
  - 1. CRI-104 Standard for Installation of Commercial Carpet.
  - 2. CRI Green Label program.

## 1.3 SUBMITTALS

- A. Samples:
  - 1. Three samples 12 IN square of each material and color specified in Drawing A603A Interior Finish Schedule.
- B. Contract Closeout Information:
  - 1. Warranty.
  - 2. Maintenance data:
    - a. See Section 01 78 23.

## 1.4 WARRANTY

- A. Written warranty for replacement of damaged or defective carpet or carpet stained by adhesives for a period of two (2) years.
- B. Written warranty that material will not significantly degrade for a period of fifteen (15) years due to the following:
  - 1. Exposure to normal light shall not affect colorfastness as measured by AATCC 16E.

2. Exposure to normal atmospheric contaminants.
  3. Excessive wear resulting in reduction of pile height by more than 15 percent in any area or pulling out of nap.
  4. Delamination from face structure and shrinkage or stretching affecting performance of face or backing structure or causing tile to curl or dome.
  5. Edge ravel.
- C. Warranty to include removal, replacement, and disposal of defective carpet.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Carpet Tile : As indicated on Interior Finish Schedule. Data sheets at the end of this spec section.
1. Basis of Design:
    - a. Match adjacent existing
    - b. Coordinate exact product style, model, and color with owner prior to purchase.

### 2.2 MATERIALS

- A. Carpet Tile:
1. First quality, no seconds or imperfections.
  2. Deliver with mill register numbers attached.
  3. Comply with applicable state and local codes.
  4. Antimicrobial;
    - a. Broad spectrum efficacy against bacteria and fungus for the life of the product.
  5. Carpet installed in the building interior shall comply with the testing and product requirements of the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers version 1.1 (CDPH/EHLB Standard Method v1.1), modeled using the standard office building protocol parameters and certified as compliant by an independent third party.
- B. Carpet Edging Strips and Carpet Base:
1. Thickness to match carpet.
  2. Color to match carpet tile.
- C. Adhesive:
1. Base: LokDots adhesive tabs by Shaw or approved equal.
  2. Carpet adhesive shall have VOC content of no greater than 50 g/L.
  3. Carpet adhesives shall contain no carcinogen or reproductive toxicant components present at more than 1 percent of total mass of the product as defined in the California Office of Environmental Health Hazard Assessment's (OEHHA) list entitled Chemicals Known to the State to Cause Cancer or the Reproductive Toxicity, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).

### 2.3 EXTRA MATERIAL

- A. Furnish Owner with minimum of five (5) percent additional material of each type, pattern and color for maintenance purposes.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verify suitability of substrate to accept installation.
- B. Verify concrete floor surfaces are suitable for Carpet Tile installation.
  - 1. Coordinate installation with requirements of Section 07 16 04 Concrete Floor Moisture Testing, and Section 07 16 05 Water Vapor Emission Control System.

## 3.2 PREPARATION

- A. Thoroughly clean areas to receive carpet tile, strip waxes and finishes.
- B. Thoroughly remove dust and vacuum, wet mop then seal concrete.
- C. Patching Compound :
  - 1. Fill cracks, joints, holes or uneven areas with non-crumbling latex base floor filler.
  - 2. Acceptable Product: Lev-L-Astic.
  - 3. Do not mix with water.
- D. Prior to commencement of work, test area with adhesive and carpet tile to determine open time and bond.
- E. Layout:
  - 1. Arrange joints symmetrically about centerline of rooms.
  - 2. Lay so pile and pattern of adjacent pieces match.
  - 3. Verify dimensions.

## 3.3 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's instructions and recommendations for uniformity of direction, seam locations, and lay of carpet pile.
  - 2. Install carpet under open bottom obstructions and under removable flanges and furnishings, and into alcoves and closets of each space.
  - 3. Provide cut outs where required.
    - a. Conceal cut edges with protective edge guards or overlapping flanges.
  - 4. Run carpet under open-bottom items such as heating convectors.
  - 5. Install tight against walls, columns, cabinets and over recessed door closers.
  - 6. Install edge guard at openings and doors wherever carpet terminates, unless indicated otherwise.
  - 7. Make clean cuts in accordance with manufacturer's recommendation.
  - 8. Butt edges to produce tightest joint possible without distortion.
  - 9. Fill or level floors at uneven areas with leveling compound and feather minimum 4 FT- 0 IN.
  - 10. Where carpet tiles abut thicker finish flooring materials, feather leveling compound for approximately 12 IN for each 1/8 IN of rise so finished surfaces align.
  - 11. Expansion joints:
    - a. Do not bridge building expansion joints with continuous carpeting.
    - b. Provide for movement.
- B. Install in accordance with manufacturer's instructions.
  - 1. Adhesive must have recommended flash time before carpet is positioned.
  - 2. Do not mix dye lots in same area.
  - 3. Install carpet tiles with arrows pointing in same direction.

- C. Install carpet edging strips, transition strips, reducer strips, at non-carpeted floor surface.
    - 1. Install with contact adhesive.
    - 2. Score and trim narrow end of reducer strip to conform to adjacent floor finish.
  - D. Install according to Architect's directions for overall patterns and borders.
    - 1. Install carpet patterns according to drawings without deviation.
    - 2. Develop templates as required.
- 3.4 CLEAN
- A. Remove spillage of adhesive from face or seam using remover provided by manufacturer.
  - B. Remove loose threads with broadloom scissors.
  - C. Remove spots.
  - D. Completely and thoroughly vacuum using pile lifter.
  - E. Save cuts over 9 IN for Owner stock.
  - F. Advise Owner regarding care and maintenance.
- 3.5 PROTECTION
- A. Protect carpet subject to traffic with nonstaining building material paper runners or other approved material.
  - B. Protect installation from rolling traffic with sheets of hardboard or plywood.
  - C. Maintain carpet protection on each floor or area until accepted.
- 3.6 INSPECTION
- A. Inspect installation and verify work is complete and properly installed.

END OF SECTION



**SECTION 099123- PAINTING**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Work Included: Interior painting, complete as shown on Drawings and as specified.
1. Work includes, but is not limited to, painting of following items, materials, and spaces:
    - a. Paint every interior exposed-to-view unfinished surface, except as otherwise shown on Drawings or as specified.
    - b. Paint the following exposed mechanical and electrical items to match adjacent surfaces even if the items are factory-finished:
      - 1) Wall and ceiling diffusers/registers installed in gypsum board assemblies at any location.
      - 2) Access doors at any location except when concealed above suspended ceilings.
      - 3) Flush-mounted electrical panelboards and cabinets in gypsum board assemblies at any location.
      - 4) All exposed piping, conduit, duct work and similar surfaces in Stair Enclosures and Fire Control Room (except items with factory "red" finish).
    - c. Paint semi-visible areas behind registers, grilles, diffusers, screen vents as required to "black out".
    - d. Paint auxiliary rails of smoke containment screens with high-temperature coating.
    - e. Stairs: Paint all exposed ferrous metal assemblies, concrete landings and treads, including hazard striping as required by code.
  2. Do not paint the following items:
    - a. Factory-finished items specified in various Sections.
    - b. Pre-finished wall, ceiling, and floor coverings.
    - c. Concrete traffic or walking decks, walks, steps, and ramps.
    - d. Code-Required Labels: Keep equipment identification and fire rating labels free of paint.
    - e. Surfaces concealed in walls and above ceilings except as specifically indicated otherwise.
    - f. Ducts, piping, conduit, and equipment concealed in walls and ceilings, unless specifically indicated otherwise.
    - g. Do not paint "Shell Areas" as shown on drawings except paint all sides of doors and frames at walls into finished areas.
    - h. Mechanical or elevator shafts not requiring periodic cleaning.
    - i. Mechanically-finished nonferrous metal, such as stainless steel, aluminum, and bronze, except exposed mechanical and electrical items.
    - j. Interior spaces specifically noted as unpainted.
  3. Note: This Section includes a comprehensive listing of paint finish types. Not all paint systems included herein may be required by the Scope of Work of this Project, or the scope of some finishes may be very limited. The responsibility of the Contractor to schedule the Work so that all

specified and required Painting Scope is included in the Scope of Work for the Project.

- B. Work Specified Elsewhere:
  - 1. Section 050500 – Metal Fasteners.
  - 2. Section 079200 – Joint Sealants.

## 1.2 SUBMITTALS

- A. Comply with requirements of Section 013300 – Submittal Procedures.
- B. Product Data: Submit complete list of materials proposed for use, together with manufacturer's data and specifications.
- C. Samples:
  - 1. Opaque Colors and Finishes: Submit samples, on hardboard, using materials accepted for Project, of each color and paint finish selected with texture to simulate actual conditions. Prepare three samples, 8-1/2 inches by 11 inches, with required number of paint coats clearly visible.
  - 2. Transparent and Stained Finishes: Prepare samples on species and quality of wood to be used in the Work. Re-submit as requested until acceptable sheen, color, and texture are achieved. Label and identify each sample as to location and application.

## 1.3 QUALITY ASSURANCE

- A. Labeling: Include following on label of each container:
  - 1. Manufacturer's name and product name.
  - 2. Generic type of paint.
  - 3. Manufacturer's stock number.
  - 4. Color.
  - 5. Instructions for reducing, where applicable.
- B. Special Requirements of Regulatory Agencies: Use materials for Work of this Section which comply with volatile organic compound limitations and other regulations of local Air Quality Management District and other local, state, and federal agencies having jurisdiction.
- C. Project Mock-Up: As directed by the Architect, apply on actual wall surfaces where designated, samples of each and any color selected for final review.
  - 1. On at least 100 square feet of surface as directed, provide full-coat finish samples until required sheen, color and texture are obtained.
  - 2. Duplicate painted finishes of prepared samples.
  - 3. Simulate finished lighting conditions for review of in-place work.

## 1.4 PRODUCT HANDLING

- A. Comply with requirements of Section 016000 – Product Requirements.

- B. Delivery: Deliver material in sealed containers with labels legible and intact.
- C. Storage of Materials:
  - 1. Store only acceptable Project materials on Project site.
  - 2. Store in suitable location.
  - 3. Restrict storage to paint materials and related equipment.
  - 4. Comply with health and fire regulations.

#### 1.5 PROJECT CONDITIONS

- A. Environmental Requirements:
  - 1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be stored and applied.
  - 2. Do not apply finish in areas where dust is being generated.
- B. Protection: Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted.

#### 1.6 SCHEDULING

- A. Gypsum Board: Verify that a fully-cured skim coat has been applied to Gypsum Board specified for Level 5 finish and scheduled to receive semi-gloss or gloss paint finishes. Do not proceed until completed.

#### 1.7 MAINTENANCE

- A. Extra Materials: At completion of Work, deliver to Owner extra stock of paint of one gallon of each color used of each coating material used. Tightly seal and clearly label containers.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Primers and Single-color Paints: Provide paint systems as manufactured by the following manufacturers. Unless otherwise specified, single source all components of a paint system from a single manufacturer, including primer/sealer/undercoat and body and finish coats to assure compatibility.
  - 1. Basis of Design: Sherwin Williams

#### 2.2 MATERIALS

- A. General: Provide materials selected for coating system for each type of surface which are the product of single manufacturer.
- B. Thinner: As recommended by each manufacturer for his respective product.

- C. Unsuitability of Specified Products: Claims concerning unsuitability of any materials specified will not be entertained, unless such claim is made in writing to the Architect before Work is started.

2.3 COLORS

- A. Color and Sheen: Field verify color to match adjacent existing (or as selected by Architect if not scheduled on Drawings) based on standard color chips provided by one or more of the listed manufacturers.
- B. Mixing: Deliver paints and stains ready mixed to Project site.

2.4 MILDEW RESISTANCE

- A. General: Add fungicidal agent to paint per manufacturer's recommendations. Add agent to paint at factory. Clearly indicate on labels that paint is mildew resistant.

2.5 PRODUCT LIST

- A. Interior Products:

	<u>BM</u>	<u>ICI</u>	<u>S/W</u>	<u>FRA</u>
Alkyd Sealer	C245	1310	B49WZ2	367
PVA Sealer	284	1030	B28W200	061
Alkyd Enamel Undercoater	C245	1120	B49WZ2	367
Latex Enamel Undercoater	284	1020	B28W200	065
Concrete Sealer	066	3210	A24W300	065
Ferrous Metal Primer	M04	4160	B50NZ2	661F774
Galvanized Metal Primer	M04	4120	B66W1	661F774
Aluminum Primer	M04	4120	B66W1	661F774
Acrylic Epoxy Undercoater	M08/ M09	3210	B67W002 13-16	266
Latex Wall Paint, Eggshell	274	1403	B20W200	022
Latex Enamel, Semi-Gloss	276	1406	B31W200	128
Acrylic Epoxy, Semi-Gloss	M43/ M44/ M86	4406	B67V002 00-16	-----
Industrial Maintenance Enamel	M28	4328	B54WZ	648/628
Aluminum Paint	055/ 170/ M29	4318- 9020	B59S11	Sheffield Alum.
High-Temperature Coatings	M28	4328	850 Series	Ameron Hi- Heat

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verification of Conditions: Examine surfaces scheduled to receive paint and finishes for conditions that might adversely affect execution, permanence, or quality of work and which cannot be put into acceptable condition through preparatory work. Proceed with preparation or coating application only when conditions are satisfactory.
- B. Review all questions regarding the scope of painting with Owner prior to proceeding with Work.

## 3.2 SURFACE PREPARATION

- A. General: Remove scale, dirt, dust, grit, rust, wax, grease, efflorescence, loose material, and other foreign matter detrimental to proper adhesion of paint.
- B. Gypsum Board:
  - 1. Narrow, Shallow Cracks and Small Holes: Fill with spackling compound.
  - 2. Deep, Wide Cracks and Deep Holes: Rake out, dampen with clear water, and fill with thin layers of gypsum board joint compound.
  - 3. Curing: Allow to dry.
  - 4. Sanding: Sand smooth after drying; do not raise nap of paper on gypsum board.
- C. Metals:
  - 1. Chipped or Abraded Areas in Shop Coatings: Touch-up using appropriate primer.
  - 2. Galvanized Surfaces: Apply a wash coat made by dissolving 8 ounces copper acetate or copper sulfate in one gallon of water; apply with brush.
  - 3. Stainless Steel: Scarify surfaces before applying prime coat.
- D. Wood:
  - 1. General: If required, sandpaper surfaces smooth before applying primer. Thoroughly clean knots; apply thin coat of knot sealer over surfaces shown to receive opaque finish.
  - 2. Back Priming: Back prime surfaces installed against cementitious surfaces; give particular attention to sealing cross-grained surfaces.
  - 3. Puttying:
    - a. General: Fill nail holes, cracks, and other depressions flush with putty after prime coat application. Allow putty to dry; sandpaper smooth before applying body coat.
    - b. For Opaque Finish: Linseed oil type putty.
- E. Protection:

1. General: Properly protect floors and other adjacent work by drop cloths or other suitable coverings. In areas scheduled for painting, maintain wrappings and factory-applied protection provided by other trades.
  2. Hardware and Other Obstructions: Remove or protect factory finished items such as hardware, plates, lighting fixtures, grilles, and similar items placed prior to painting. Reposition or remove protection upon completion of each space. Equipment adjacent to surfaces requiring paint disconnected, moved, reset, and reconnected by respective trades.
  3. Fire Precautions: At end of each work day, place in metal containers or remove from premises, solvent soaked cloths, waste, and other materials which constitute a fire hazard.
- F. Moisture Content: Do not apply initial coating until moisture content of surface is within limitations recommended by paint manufacturer.

### 3.3 APPLICATION

- A. General: Apply paint per manufacturer's instructions and as specified. Thoroughly stir paint and keep at uniform consistency during application. Apply paint evenly, free from drops, ridges, waves, laps, and brush marks; finished surface uniform in sheen, color, and texture. Apply succeeding coats to unscarred and completely integral base coats; slightly vary color of undercoats to distinguish them from preceding coat. Allow sufficient time between coats to assure proper drying. Sandpaper smooth interior finishes between coats.
- B. Prime Coat: Do not thin primers in excess of manufacturer's printed directions. Apply by brush, unless otherwise specified, within 8 hours after cleaning.
- C. Body and Finish Coats: Do not thin; apply by brush, roller or spray.
- D. Drying Time: Comply with recommendations of product manufacturer for drying time between succeeding coats.
- E. Moldings and Ornaments: Leave clean and true to details with no undue amount of paint in corners and depressions.
- F. Edges of Paint: Where adjoining other materials or colors, make clean and sharp with no overlapping.
- G. Refinishing: Refinish entire wall where portion of finish is deemed not acceptable.
- H. Precaution: Do not paint over fusible links, UL labels, or sprinkler heads.
- I. Exposed Plumbing and Mechanical Items: Finish items without factory finish such as conduits, pipes, access panels, and items of similar nature to match adjacent wall and ceiling surfaces, unless otherwise directed.

### 3.4 CLEANING

- A. General: Touch up and restore finish where damaged. Remove spilled, splashed, or spattered paint from surfaces. Do not mar surface finish of item being cleaned.
- B. Storage Space: Leave clean and in condition required for equivalent spaces in Project.

### 3.5 PAINT SYSTEMS

- A. Schedule: Only major areas are scheduled. Treat miscellaneous and similar items and areas within room or space with similar system.
- B. Number of Coats: Where number of coats are specified, it is only as a minimum requirement. Apply additional coats, at no additional cost to Owner, if necessary to completely hide base material, produce uniform color, and provide satisfactory finish result.
- C. Thickness of Coats: For each paint system product, provide the manufacturer's recommended mil-thickness for each applied coat.
- D. Systems Specifications: These specifications are a guide and are meant to establish procedure and quality. Confer with Architect to determine exact finish desired.
- E. Acceptance of Final Colors: Do not apply final coats of paint for either exterior and interior systems until colors have been reviewed and accepted by the Architect.

### 3.6 INTERIOR PAINT SYSTEMS (Field Verify to match adjacent existing)

- A. Interior Gypsum Board – Flat:
  - 1. General: Provide as follows unless otherwise scheduled on Drawings or noted as follows in this Section.
  - 2. 1st Coat: Gypsum Board Primer.
  - 3. 2nd Coat: Acrylic Paint, Flat.
  - 4. 3rd Coat: Acrylic Paint, Flat.
- B. Interior Gypsum Board – Eggshell/Satin:
  - 1. General: Provide as follows unless otherwise scheduled on Drawings or noted as follows in this Section.
  - 2. 1st Coat: Gypsum Board Primer.
  - 3. 2nd Coat: Acrylic Paint, Eggshell/Satin.
  - 4. 3rd Coat: Acrylic Paint, Eggshell/Satin.
- C. Interior Gypsum Board – Semi-gloss:
  - 1. General: Provide at stairs, service areas and where scheduled.
  - 2. 1st Coat: Gypsum Board Primer.
  - 3. 2nd Coat: Acrylic Paint, Semi-Gloss.
  - 4. 3rd Coat: Acrylic Paint, Semi-Gloss.

D. Interior Gypsum Board – 2-part Epoxy Coatings: (for clean rooms, ante rooms, and restrooms)

1. General: Provide 2-part epoxy coatings at Clean Rooms, Ante Rooms, Restrooms and other gypsum surfaces as scheduled on Drawings and required by the governing Health Codes:
2. 1st Coat: Primer for Epoxy Paint.
3. 2nd Coat: Epoxy Semi-Gloss.
4. 3rd Coat: Epoxy Semi-Gloss.

E. Interior Ferrous Metal:

1. General: Shop and field-applied paint finishes for the Work of Section 050500 – Metal Fabrications, is included in the Scope of Work for those Sections.
2. For other exposed-to-view ferrous metal items, including items specified in DIVISION 23 – Mechanical; and DIVISION 26 – Electrical, provide the finishes as follow:
3. Bare Metal Items; High Performance Coating System:
  - a. Pre-treatment: Conform with the requirements of Section 050500 – Metal Fabrications.
  - b. First Base Coat: Tnemec Co. Inc.'s 90-97 Tneme-Zinc, Keelor & Long's 9700, or equal; zinc-rich urethane with not less than 80 percent zinc in dried film; not less than 2.5 mils dry film thickness.
  - c. Second Base Coat: Tnemec Co. Inc.'s polyamide epoxy; not less than 2.5 mils dry film thickness. Tint similar to finish coat color per manufacturer's written recommendations.
  - d. Finish Coats: Tnemec's Series 1075 Endura-Shield, semi-gloss sheen or Tnemec's Series 1077 Endura-Lume as required; aliphatic acrylic polyurethane 2.5 mils dry film thickness.
4. Shop Primed or painted (by others) Items; Semi-Gloss Acrylic finish:
  - a. Preparation: Lightly sand or etch existing finish as required for application of new finishes.
  - b. Base Coat: Tnemec Co. Inc.'s polyamide epoxy; not less than 2.5 mils dry film thickness. Tint similar to finish coat color per manufacturer's written recommendations.
  - c. Finish Coats: Tnemec's Series 1075 Endura-Shield, semi-gloss sheen or Tnemec's Series 1077 Endura-Lume as required; aliphatic acrylic polyurethane 2.5 mils dry film thickness.
5. Shop Galvanized Items:
  - a. Galvanizing repair provided in Section 050500 – Metal Fabrications.
  - b. Base Coat: Tnemec Co. Inc.'s polyamide epoxy; not less than 2.5 mils dry film thickness. Tint similar to finish coat color per manufacturer's written recommendations.
  - c. Finish Coats: Tnemec's Series 1075 Endura-Shield, semi-gloss sheen or Tnemec's Series 1077 Endura-Lume as required; aliphatic acrylic polyurethane 2.5 mils dry film thickness.
7. Ferrous Metal Mechanical and Electrical Piping, Conduits, Ductwork, Supports, Hangers, Machinery and Similar Items; Industrial Enamel:
  - a. 1st Coat: Ferrous Metal Primer.
  - b. 2nd Coat: Industrial Maintenance Enamel.
  - c. 3rd Coat: Industrial Maintenance Enamel.



- F. Interior Aluminum and Copper:
1. Refer to Section 076200 – Flashing and Sheet Metal for shop and field-applied paint finishes specified in those Sections.
  2. Mechanical and Electrical Items:
    - a. Pretreatment: Metal Pretreatment.
    - b. 1st Coat: Aluminum Primer. Provide additional general purpose sealer coat when recommended by paint manufacturer.
    - c. 2nd Coat: Acrylic Paint, Semi-Gloss.
    - d. 3rd Coat: Acrylic Paint, Semi-Gloss.
- G. Interior Wood:
1. General: Transparent Finishes are specified and provided in Section 064123 Interior Architectural Woodwork
  2. 1st Coat: Latex Enamel Undercoater.
  3. 2nd Coat: Acrylic Paint; Eggshell, Semi-Gloss or Gloss as scheduled on Drawings or selected by Architect.
  4. 3rd Coat: Acrylic Paint; Eggshell, Semi-Gloss or Gloss as scheduled on Drawings or selected by Architect.
- H. Interior Mechanical Insulation; Finish Varies:
1. Provide finish materials recommended in writing by the mechanical insulation manufacturer for their products in exterior locations. Adapt the following as required.
    - a. 1st Coat: General Purpose PVA Sealer, or as recommended by the insulation manufacturer.
    - b. 2nd Coat: Match adjacent finish system.
- I. Interior Tar Coated Pipe; Gloss Enamel:
1. 1st Coat: Aluminum Paint.
  2. 2nd Coat: Industrial Maintenance Enamel.
- J. Miscellaneous Interior Painting Systems:
1. Ductwork at Grilles and Diffusers:
    - a. Apply interior surfaces of ductwork partially visible through grilles and diffusers.
    - b. 1st Coat: Galvanized Metal Primer.
    - c. 2nd Coat: Acrylic Paint, Matte Black.
    - d. 3rd Coat: Acrylic Paint, Matte Black.
  2. Exposed Insulated Pipes and Ductwork:
    - a. 1st Coat: 1 coat General Purpose PVA sealer. Omit sealer where glass fabric jackets are used.
    - b. 2nd Coat: Acrylic Paint, match adjacent finish.
    - c. 3rd Coat: Acrylic Paint, match adjacent finish.
  3. Exposed Non-Insulated Pipes and Ductwork: Including conduit.
    - a. Cast-Iron Pipe:
      - 1) Pre-treatment: Conform with the requirements of Section 050500 – Metal Fabrications.
      - 2) 1st Coat: Ferrous Metal Primer.
      - 3) 2nd Coat: Acrylic Paint, match adjacent finish.

- 4) 3rd Coat: Acrylic Paint, match adjacent finish.
- b. Other Pipes, Conduit, and Ductwork:
  - 1) Pre-treatment: Conform with the requirements of Section 050500 – Metal Fabrications.
  - 2) 1st Coat: As specified for ferrous and non-ferrous metals as applicable.
  - 3) 2nd Coat: Acrylic Paint, match adjacent finish.
  - 4) 3rd Coat: Acrylic Paint, match adjacent finish.
- K. Miscellaneous Interior Painting Systems:
  - 1. Factory Finished Equipment: Satisfactorily refinish surfaces damaged before, during, or after installation as directed; use 128 semi-gloss enamel.
  - 2. Plywood Equipment Backing:
    - a. General: Telephone, Data and Electric Closets.
    - b. 1st Coat: Latex Enamel Undercoater.
    - c. 2nd Coat: Acrylic Paint; match adjacent finish.
    - d. 3rd Coat: Acrylic Paint; match adjacent finish.
- L. Pipe Identification:
  - 1. General: Per ANSI A13.1; buried pipe, electrical conduit, and pipe in concealed spaces such as furred spaces and shafts not included.
  - 2. Color Scheme: ANSI Z53.1 in combination with legend and flow markers; continuous total length coverage. Safety colors as specified under applicable Mechanical Section.
  - 3. Legend: Stencil letters of colors, type, and sizes per ANSI A13.1. Tags for identification of pipes less than 3/4-inch overall outside diameter, including valves and fittings; provided under applicable mechanical Section.
  - 4. Flow Markers: Provide each type with appropriate size arrows to indicate flow direction in pipe; same color as legend.
  - 5. Visibility: Locate legend and flowmarkers for easy visibility from operating floor; space not over 20 feet with at least one per room.

### 3.8 CLEANING:

- A. Comply with provisions of Section 017900 – Cleaning.
- B. Remove paint spots, oil, and stains from adjacent surfaces upon completion of Work; leave Work clean.

END OF SECTION

# Sherwin Williams Contractor Job Tracking Form

To be included in Contractor Bid Package

## Instructions for Contractor:

- Please complete this form with as much information as available
- If you have an assigned Sherwin Williams Sales Representative or a Home store that services, your account please contact them directly with this form
- If you do not have a Sherwin Williams assigned account manager, please email this form to [Michael.J.Koncilja@Sherwin.com](mailto:Michael.J.Koncilja@Sherwin.com)
- This form must be forwarded to Sherwin Williams prior to the start of any Capital Expenditure Project
- A job account must be assigned for every project

## Instructions for Sherwin Williams Employees:

- Upon receiving this form please open a job account for the paint contractor
- The job account must read as follows: Intermountain Healthcare/Name of City/ Project Name
- A job account is strictly required for all IHC related projects
- Upon opening an IHC job account, an email containing the 9 digit job account number is to be sent to [Michael.J.Koncilja@Sherwin.com](mailto:Michael.J.Koncilja@Sherwin.com) for tracking purposes
- A request for this project to be linked to Parent #5540 will be communicated
- All Purchases associated with said project are to be made on this job account only

## Project Tracking Form

Name of Contractor: \_\_\_\_\_

Sherwin Williams Account number (Existing): \_\_\_\_\_

IHC Job Account number (To be assigned): \_\_\_\_\_

Name and Address of IHC related

Project: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name/Store of Sherwin Williams

Contact: \_\_\_\_\_

Estimated Materials Needed: \_\_\_\_\_

Estimated Project Start Date: \_\_\_\_\_

Additional Comments/Needs of Contractor: (I.E renderings needed,  
drawdowns required, Special environmental  
restrictions.) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**SECTION 10 26 00 – WALL AND DOOR PROTECTION**

## PART 1 - GENERAL

## 1.1 SUMMARY

A. Work Included: Provide and install wall protection, wall corner guards and other finish protection products, complete, as shown on Drawings and as specified, including:

1. Surface-Mounted Corner Guards and Partition End Guards.
2. Protective Wall Covering Wainscot

B. Work Specified Elsewhere:

1. Section 081113 – Hollow Metal Doors and Frames.
2. Section 084113 – Aluminum Entrances and Storefronts.
3. Section 081416 – Flush Wood Doors.
4. Section 079200 – Joint Sealants.
5. Section 087100 – Door Hardware
6. Section 092216 – Non-Structural Metal Framing.

## 1.2 SUBMITTALS

A. Comply with provisions of Section 013300 – Submittal Procedures.

B. Product Data: Manufacturer's catalog cuts, standard color charts, and data sheets; including installation details and instructions, for each item specified.

C. Samples:

1. Crash Rails: 12-inch-long piece of each type specified, including color.
2. Corridor Handrail: 12-inch-long piece of each specified type, including mounting bracket and specified finish.
3. Partition End and Corner Guards: 12-inch-long piece of each type specified, including color.
4. Wall protection and Door Protection: 12-inch-square piece of each specified type, including corner and specified color.

## 1.3 PRODUCT HANDLING

- A. Delivery and Storage: Deliver and store items and related fasteners in manufacturer's original packaging, identified with manufacturer's name and type of product, and size. Store materials indoors, protected from moisture and other sources of damage.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. General: Provide vinyl/acrovyn wall and corner protection single-sourced from one manufacturer to assure color matching.
- B. Manufacturer: Inpro Corporation, Construction Specialties, Inc., Pawling Corporation OR Korogard
  - a. Basis-of-Design: Construction Specialties Acrovyn 4000
- C. Fire Hazard Classification: Flame spread of 25 or less when tested per ASTM E84.

### 2.3 CORNER GUARDS

- A. Type: C/S Acrovyn 4000 Corner Guards – SSM-20AN with continuous aluminum retainer.
  - 1. Size: 2" X 2" X 4'-0".
  - 2. Mounting Style: Surface-mounted.
  - 3. Color: As scheduled on Drawings.
  - 4. Mounting Height: 4 feet high from top of finished floor unless noted otherwise.
  - 5. Locations: Typical at all corners and as shown on Drawings.

### 2.4 PROTECTIVE WALL COVERING WAINSCOT

- A. Type: Sheet plastic wall protection by C/S acrovyn. Typical where shown on Drawings.
  - 1. Size: 0.06" thick Acrovyn 4000 panels by sizes shown on Drawings.
  - 2. Mounting Style: Surface-mounted.
  - 3. Color: As scheduled on Drawings.
  - 4. Mounting Height: From finished floor to 4 feet above finish floor unless noted otherwise. Align top of wall protection with top of corner guards where occurs.

5. Locations: As shown on Drawings.

## 2.5 PARTITION END PROTECTION

- A. Manufacturer: Acrovyn by Construction Specialties, Inc. (C/S); IPC Door and Wall Protection by InPro Corporation (IPC).C/S Acrovyn specified as basis-of-design.
- B. Type: Composite assembly consisting of two Acrovyn SSM-20AN corner guards and partition-end infill panel of adhesive-applied .060-inch-thick Acrovyn sheet.
  1. Size: Verify partition width; 2-inch return at each wall face.
  2. Mounting Style: Surface-mounted.
  3. Color: As scheduled on Drawings.
  4. Mounting Height: From finish floor to 4 feet above finish floor.
  5. Provide manufacturer's coordinated top and bottom caps.
  6. Locations: At all wall end partitions, typical.

## 2.6 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's standard, removable, corrosion-resistant fasteners of size and length suitable for the conditions of installation.
- B. Adhesive: As recommended by manufacturer for setting material.
- C. Backing Plates: As specified in Section 092216 – Non-Structural Metal Framing and as shown on Drawings.
- D. Products shall be furnished as a complete packaged system, including appropriate Adhesive, Primer, Caulking and Trims per manufactures recommendations.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: After application of wall base and finish painting of walls is complete, examine areas and conditions under which items are to be installed. If unsatisfactory conditions exist, do not proceed with the Work until such conditions have been corrected.

### 3.2 PREPARATION

- A. Cleaning: Prior to application, clean side of units that will be in contact with wall surface.

### 3.3 INSTALLATION

- A.** Install the work of this section in strict accordance with the manufacturer's recommendations, using only approved mounting hardware and locating all components firmly into position, level and plumb.
- B.** Temperature at the time of installation must be between 65°-75°F (18°-24°C) and be maintained for at least 48 hours after the installation.
- C.** Adjust installed end caps as necessary to ensure tight seams.

### 3.4 ADJUSTING AND CLEANING

- A. Cleaning: Prior to time of final acceptance, strip units of protective coverings, and clean in accordance with manufacturer's instructions.
- B. Defective Materials: Remove and replace any defective, misaligned, or damaged units, at no additional cost to Owner.

END OF SECTION



**SECTION 11 70 00 - HOSPITAL EQUIPMENT - GENERAL REQUIREMENTS**

PART 1 – GENERAL

1.1 SUMMARY

- A. Furnish labor, materials, tools, equipment, and services for Hospital Equipment - General Requirements, as indicated, in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.

1.2 QUALITY ASSURANCE

- A. Dimensions, voltages, electrical power requirements, and utility connections are based on items specified.
- B. Contractor is responsible for costs for dimensional adjustments and for providing or arranging for additional electrical or utility services or equipment required as a result of using approved substitute products.
- C. If necessary to vary from arrangement indicated, make such variations only after approval of Architect and at no additional expense to Owner.
- D. Field verify dimensions involving work. Measure recesses and openings and provide trim pieces, fillers, closures in sizes required.
- E. Equipment may be inspected by Owner at manufacturer's plant prior to shipment.
- F. Equipment found not in accordance with specifications and approved drawings may be rejected.
- G. Replace rejected equipment at no cost to Owner.
- H. Electric operated equipment, heated equipment, or both:
  - 1. Comply with latest version of National Electrical Manufacturer's Association (NEMA), National Electric Code (NEC) and Underwriters' Laboratories, (UL).
- I. Installer qualifications: Manufacturer, or approved in writing by manufacturer.

1.3 SUBMITTALS

- A. Shop Drawings:
  - 1. Submit drawings to indicate arrangement and location of equipment.

2. Complete equipment list including manufacturer, model number, power and utility requirements, room name and number where located.
- B. Product Data:
1. Manufacturers standard literature describing specified equipment.
  2. Installer qualifications.
- C. Contract Closeout Information:
1. Warranty.
  2. Operation and Maintenance data.
    - a. See Section 01 78 23.
  3. Contract closeout information not required for Owner furnished equipment.

#### 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Contractor Installed - Contractor furnished new equipment:
1. Contractor store equipment to prevent damage to materials or structure in dry, weathertight, ventilated spaces.
  2. Deliver to site in manufacturer's original labeled containers.
  3. Protect exposed surfaces and edges until work is completed.
  4. Repair or remove and replace damaged or rejected work.
- B. Contractor Installed - Owner furnished new equipment:
1. Owner to receive and store new equipment. Contractor to obtain such equipment from Owner's storage location, deliver to site and install.
  2. Deliver to site in manufacturer's original labeled containers.
  3. Protect exposed surfaces and edges until work is completed.
  4. Contractor to provide fasteners, supports, or other miscellaneous items necessary for complete installation, not provided by equipment manufacturer.
  5. Owner to provide Contractor with rough-in and installation Drawings of purchased equipment.
  6. Delivery place and time to be determined by Owner but not necessarily during normal working hours.
- C. Contractor Installed - Owner furnished existing equipment:
1. Contractor disconnect, remove, store and install such equipment in same manner as new equipment. Replace fasteners or supports as required.
  2. Inspect equipment at existing location if rough-in and installation drawings are unavailable.
- D. Contractor and Owner mutually inspect existing equipment prior to removal, upon delivery to new location, and after installation to verify physical appearance and working condition.

## 1.5 WARRANTY

- A. Manufacturer's standard warranty against equipment failure, including cost of shipping, repair, replacement and legal discard of waste materials.
- B. Equipment furnished by Owner for installation by Contractor, shall be excluded from Contractor's one year warranty.

## PART 2 - PRODUCTS

## 1.6 ACCEPTABLE MANUFACTURERS

- A. Hospital equipment: Manufacturers indicated in equipment schedules are used as basis of design.
- B. Other manufacturers desiring approval comply with Section 00 26 00.

## 1.7 EQUIPMENT

- A. Provide equipment of each specialty type, as designated by Sections referenced, by one manufacturer, insofar as is possible, and except as otherwise indicated.

## 1.8 EQUIPMENT SCHEDULE

- A. Hospital program equipment: Reference Schedule 1.
- B. Intermountain Medical Group program equipment: Reference Schedule 2.

## PART 3 - EXECUTION

## 1.9 INSPECTION

- A. Examine substrates and conditions under which work is to be performed.
- B. Insure that adequate Wall Backing has been installed.
  - 1. Metal Wall Backing: Specified in Section 09 22 16.
  - 2. Coordinate and direct installation of backing required for wall-mounted equipment.
- C. Correct unsatisfactory conditions.
- D. Start of work constitutes acceptance of responsibility for performance.

## 1.10 INSTALLATION

- A. Install per manufacturer's printed instructions, drawings, or both.
- B. Except for final connection, installation of each item shall be complete in every respect.
  - 1. Provide controls, regulating devices and other accessories necessary for proper operation and maintenance of equipment including, but not necessarily limited to, pressure reducing valves, strainers, steam traps, control valves, relief valves, etc.
  - 2. Include these accessories whether or not they are specifically indicated.
- C. Where an item of equipment is furnished without a cord and plug, electrical wiring from equipment shall be brought to an equipment junction box to make a final connection between item and junction box with flexible connection.
- D. Provide stands, supports, sleeves, collars, escutcheons, ferrules, brackets, braces or other miscellaneous items required for a complete installation.
- E. Repair damage done to premises as a result of installation.
- F. Repair or replace damaged, stained or rejected work.
- G. Test and adjust items of equipment for satisfactory operation.
- H. Remove debris left by this installation.

## 1.11 OWNER INSTRUCTION

- A. Perform instruction of Owner personnel

END OF SECTION

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**SECTION 149207 - PNEUMATIC TUBE**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SECTION INCLUDES

- A. The contractor shall furnish and install all motor starters and drives with properly sized thermal overload protection in each at the blower packages.
- B. Furnish, install and terminate all low voltage plenum rated control wire.
  - 1. The low-voltage communication wiring is to be securely tie-wrapped to the tube. Tie wraps should be installed at a minimum of every (5) feet.
  - 2. In areas where the cable does not follow the tube route, the control wire must be properly installed in electrical conduit.
  - 3. Where the cable penetrates a fire-rated wall or floor, the penetrations must meet the applicable code requirements for fire penetrations. At a minimum, the control wiring shall be installed in conduit that extends six inches (6") on either side of the rated wall or floor and fire caulking applied to the ends of the conduit and the penetrations through the wall or floor.
  - 4. The contractor shall provide all junction boxes required for the installation of remote indicators.
  - 5. The vendor may recommend the use of ethernet in lieu of low-voltage communications wiring. This shall be presented as a vendor suggested alternate.
- C. The system electronics shall not interfere with telemetry equipment.
- D. The tube routing and equipment placement shall be properly designed and coordinated through the shop drawings to avoid placement over patient care areas. In areas where installation over patient care areas is unavoidable, the Contractor shall install sound insulation on the tubes and architectural sound attenuation boxes around the equipment that are over patient areas. The sound insulation should extend a minimum of six feet (6'-0") on either side of the patient care area. The Contractor is to submit all sound attenuation measures and insulation cut sheets to the Owner for approval. Insulation shall be a minimum of one and one-half inch (1- 1/2") thick layer of one and one-half (1-1/2") pcf density fiberglass insulation with dust cover and taped joints over the tubing or equivalent.

## 1.3 SCOPE

- A. All low voltage wiring related to the specimen tube system shall comply with the installation guidelines called out in Div. 27.

## 1.4 DESCRIPTION OF WORK

- A. System supplier shall provide all engineering, equipment, materials and labor for a complete turn-key expansion of the six-inch (6") automated computer-controlled pneumatic tube system.

END OF SECTION

**SECTION 211000 - WATER-BASED FIRE-SUPPRESSION 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. This Section includes the following fire-suppression piping inside the building:

1. Wet-pipe sprinkler systems.
2. Description: Remodel of existing wet system.

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. Summary Table:

Item	Summary
Interior pipe type	Mains: Schedule 40 Branchlines: Threadable thinwall or schedule 40
Sprinkler Finish	Flat Plate Concealed, except uprights and storage. Match existing.
Extended Coverage	Not Allowed
Center of Tile	Required, Center thirds are acceptable for rectangular tiles
Flexible Sprinkler Drops	Designers preference
FM Global	Not Applicable.
Calculations	Not required when basis of original design is maintained.
Alarm Device	Outside of Scope

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. Hose connections are included if indicated.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Standard Piping System Component Working Pressure: Listed for at least 175 psig.
- B. Design sprinkler piping according to the following and obtain approval from engineer, prior to submitting to other authorities having jurisdiction:
  - 1. Design sprinkler system to the existing conditions without modifying system design basis as is found on riser tags and evidenced throughout existing building.

Flow data available at 500 E 1400 N Logan, UT 84341

Static – 128 psi

Residual – 90 psi

Flowing – 2,599 gpm

Date of Test – 08/14/2019 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. Library Stack & File Storage Areas: Ordinary Hazard, Group 2.
  - e. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
  - f. Office and Public Areas: Light Hazard.
- 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.



4. Maximum Protection Area per Sprinkler:
    - a. Office Spaces: 225 sq. ft.
    - b. Storage Areas: 130 sq. ft.
    - c. Mechanical Equipment Rooms: 130 sq. ft.
    - d. Electrical Equipment Rooms: 130 sq. ft.
    - e. Record Storage Areas: 100 sq. ft.
    - f. Other Areas: According to NFPA 13 recommendations, unless otherwise indicated.
  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.
  6. Sprinklers are to be installed throughout the premises, as required by NFPA 13.
- C. Seismic Performance: Fire-suppression piping shall be capable of withstanding the effects of earthquake motions determined according to NFPA 13.

## 1.6 SUBMITTALS

- A. Product Data: For the following:
  1. Piping materials, flexible connections, 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. 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 Fire Marshal.
- C. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping".
- D. Welding certificates.
- E. Field quality-control test reports.

## 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) FireTrol
    - 9) FireFly Fire Protection
    - 10) Paradise 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.
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:
1. IBC-2018, "International Building Code."
  2. IFC-2018, "International Fire Code."
- F. Utah Amendments
1. Title 15A

## 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. It is required that the sprinkler contractor shall remove any and all piping which interferes with the new building system design and installations.

#### 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 two 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.

#### 1.10 General Engineering Quality

- A. Unless noted otherwise the following applies:

- 1. Flexible sprinkler drops shall not be used without thorough supporting hydraulic calculations proving the functionality of the system with their added impact.
  - 2. In the event of multiple (3) submittal rejections (including revise and resubmit) a meeting shall be held at the engineer's office at the engineer time of choosing and the designer, fire sprinkler contractor, and general contractor shall be physically in attendance to discuss the required modifications to the design.

### 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.

- 1. Cast-Iron Threaded Flanges: ASME B16.1.
  - 2. Malleable-Iron Threaded Fittings: ASME B16.3.
  - 3. Gray-Iron Threaded Fittings: ASME B16.4.
  - 4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe hot-dip galvanized where indicated. Include ends matching joining method.

5. Steel Threaded Couplings: ASTM A 865 hot-dip galvanized-steel pipe where indicated.
- B. Plain-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795 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.
- C. Plain-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795 hot-dip galvanized-steel pipe where indicated.
  1. Steel Welding Fittings: ASTM A 234/A 234M, and ASME B16.9 or ASME B16.11.
  2. Steel Flanges and Flanged Fittings: ASME B16.5.
- D. Grooved-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, roll-grooved ends.
  1. Grooved-Joint Piping Systems:
    - a. Manufacturers:
      - 1) Anvil International, Inc.
      - 2) Central Sprinkler Corp.
      - 3) Victaulic Co. of America.
      - 4) Ward Manufacturing.
    - 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, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.
- E. Threaded-End, Threadable, Thinwall 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.
  1. Cast-Iron Threaded Flanges: ASME B16.1.
  2. Malleable-Iron Threaded Fittings: ASME B16.3.
  3. Gray-Iron Threaded Fittings: ASME B16.4.
  4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe.
  5. Steel Threaded Couplings: ASTM A 865.
- F. Plain-End, Threadable, Thinwall 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, Thinwall Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and greater than Schedule 10.
  - 1. Steel Welding Fittings: ASTM A 234/A 234M, and ASME B16.9 or ASME B16.11.
  - 2. Steel Flanges and Flanged Fittings: ASME B16.5.
- H. Grooved-End, Threadable, Thinwall 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.
      - 4) Ward Manufacturing.
    - 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, prelubricated 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, Thinwall 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, lightwall, 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, lightwall, 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, lightwall, with plain ends is not allowed.

### 2.3 CPVC TUBE AND FITTINGS

- A. CPVC is not allowed.

### 2.4 FLEXIBLE SPRINKLER DROPS

- A. Flexible Sprinkler drops are not allowed.

## 2.5 FLEXIBLE PIPE CONNECTORS (SEISMIC)

- A. Flexible connectors shall be FM approved with exterior wire braid and 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: Flanged.
  3. Option for NPS 2-1/2 and Larger: Grooved for use with grooved-end-pipe couplings.
- B. Manufacturers:
1. Flexicraft Industries.
  2. Flex-Pression, Ltd.
  3. 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.

## 2.6 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 systems.
- 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. Manufactures:
- 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.
- D. Sprinkler Inspector's Test Fitting: Cast- or ductile-iron housing with threaded inlet and drain outlet and sight glass.

- E. Drop-Nipple Fittings: UL 1474, adjustable with threaded inlet and outlet, and seals.

## 2.7 SPRINKLERS

- A. Sprinklers shall be UL listed or FMG approved, with 175-psig minimum pressure rating.
- B. Manufacturers:
  - 1. Globe Fire Sprinkler Corporation.
  - 2. Reliable Automatic Sprinkler Co., Inc.
  - 3. Victaulic Co. of America.
  - 4. Viking Corp.
  - 5. Tyco Fire
- 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 only as follows:
  - 1. Semi-Recessed white sprinkler with glass bulb activation.
  - 2. Institution sprinklers, made with a small, breakaway projection.
  - 3. Quick-response sprinklers.
  - 4. Standard Coverage sprinklers.
  - 5. Upright sprinklers.
- F. Sprinkler Finishes: Factory painted White.
- G. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications.
  - 1. Ceiling Mounting: Semi-recessed, White
  - 2. Sidewall Mounting: Semi-Recessed, white.
- H. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. 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.
- B. Examine new ductwork, plumbing, electrical, and all other disciplines design and installation before installing pipe, to ensure no conflicts are present.

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

### 3.2 PIPING APPLICATIONS

- A. Shop weld pipe joints where welded piping is indicated.
- B. Do not use welded joints for galvanized-steel pipe.
- C. 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.
- D. Branch line piping: Use the following:
  - 1. NPS 1-1/4 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
    - b.

### 3.3 JOINT CONSTRUCTION

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

### 3.4 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. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. 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.
- E. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
- F. Install sprinkler piping with drains for complete system drainage.
- G. Hangers and Supports: Comply with NFPA 13 for hanger materials. Install according to NFPA 13 for sprinkler piping and to NFPA 14 for standpipes.
  - 1. No powder driven studs allowed.
  - 2. Wrap-around braces are to be provided at end of branch lines.
- H. Earthquake Protection: Install piping according to NFPA 13-9.3 requirements, to protect from earthquake damage. Seismic Bracing shall be designed to withstand vertical forces and movement.
- I. 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.
- J. When a fire pipe crosses a seismic expansion joint it shall have a Metraflex fire loop installed at the joint in accordance with NFPA 13 chapter 9.

### 3.5 SPRINKLER APPLICATIONS

- A. General: All sprinklers are to be quick response type with frangible glass bulb. 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 which match existing conditions. Install quick response sprinklers throughout space.

### 3.6 SPRINKLER INSTALLATION

- A. Every effort shall be required to ensure that the heads form a symmetrical pattern in the ceiling with the ceiling grid if included, as well as lights, diffusers and grilles. Offsets shall be made in piping to accommodate ductwork in the ceiling. Heads shall be symmetrical in all ceilings and all piping run parallel or perpendicular to building lines. Heads shall be linearly aligned in corridors.
  - 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. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.
  - D. Future finish shelled and tenant finish; Shell spaces shall be piped to accommodate future. Install sprinklers with 1" x ½" bushings, and space heads at a maximum spacing of 100 sq. ft. per head. Occupancy shall be Ordinary-Hazard Group 1 Design.
  - E. NFPA 13 and NFPA 14 and in Division 23 Section "Common Work Result for HVAC."

### 3.7 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. When making a mechanical tee connection the coupon shall be attached at the mechanical tee.
- D. Report test results promptly and in writing to Architect and authorities having jurisdiction.

### 3.8 CLEANING

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

### 3.9 PROTECTION

- A. Protect sprinklers from damage until Substantial Completion.

### 3.10 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. Fill wet-pipe sprinkler piping with water.

### 3.11 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.
- 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. This includes any 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.
- 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.

### 3.12 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.

### 3.13 FIELD QUALITY CONTROL

- A. 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 211000

**SECTION 23 0100 - MECHANICAL REQUIREMENTS**

## PART 1 - GENERAL

## 1.1 GENERAL CONDITIONS

- A. The General Conditions of the Contract, with the amendments, supplements, forms and requirements in Division 1, and herewith made a part of this Division.
- B. All sections of Division 21, 22, & 23 shall comply with the Mechanical General Requirements. The standards established in this section as to quality of materials and equipment, the type and quality of workmanship, mode of operations, safety rules, code requirements, etc., shall apply to all sections of this Division as though they were repeated in each Division.
- C. Mechanical equipment that is pre-purchased if any will be assigned to the Mechanical Contractor. By assignment to the Mechanical Contractor, the Mechanical Contractor shall accept and installed the equipment and provide all warranties and guarantees as if the Mechanical Contractor had purchased the equipment.
- D. Construction Indoor-Air Quality Management
  - 1. Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."
    - a. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
    - b. Replace all air filters immediately prior to occupancy.

## 1.2 SCOPE OF WORK

- A. The project described herein is the **LOGAN REGIONAL HOSPITAL – 2<sup>ND</sup> FLOOR IMAGING**. This work shall include all labor, materials, equipment, fixtures, and devices for the entire mechanical work and a complete operating and tested installation as required for this project.

## 1.3 CODES &amp; ORDINANCES

- A. All work shall be executed in accordance with all underwriters, public utilities, local and state rules and regulations applicable to the trade affected. Should any change in the plans and Specifications be required to comply with these regulations, the Contractor shall notify the Architect before the time of submitting his bid. After entering into contract, the Contractor will be held to complete all work necessary to meet these requirements without extra expense to the Owner. Where work required by drawings or specifications is above the standard required, it shall be done as shown or specified.
- B. Applicable codes:
  - 1. Utah Boiler and Pressure Vessel Rules and Regulations-2019 Edition

2. International Building code- 2018 Edition
3. International Mechanical Code- 2018 Edition
4. International Plumbing Code- 2018 Edition
5. International Fire Code- 2018 Edition
6. International Energy Code- 2018 Edition
7. International Fuel Gas Code- 2018 Edition
8. National Electrical Code- 2017 Edition

#### 1.4 INDUSTRY STANDARDS

- A. All work shall comply with the following standards.
1. Associated Air Balance council (AABC)
  2. Air Conditioning and Refrigeration Institute (ARI)
  3. Air Diffusion council (ADC)
  4. Air Movement and Control Association (AMCA)
  5. American Gas Association (AGA)
  6. American National Standards Institute (ANSI)
  7. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
  8. American Society of Mechanical Engineers (ASME)
  9. American Society of Testing Materials (ASTM)
  10. American Water Works Association (AWWA)
  11. Cooling Tower Institute (CTI)
  12. ETL Testing Laboratories (ETL)
  13. Institute of Electrical and Electronic Engineers (IEEE)
  14. Hydronics Institute (HI)
  15. Manufacturers Standardization Society of the Valve and Fitting Industry (MSS)
  16. National Fire Protection Association (NFPA)
  17. National Electrical Code (NEC)
  18. National Electrical Manufacturers Association (NEMA)
  19. National Electrical Safety code (NESC)
  20. Utah safety Standard (OSHA), Utah State Industrial Council.
  21. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)
  22. Underwriters Laboratories (UL)
  23. Tubular Exchanger Manufacturers Association, Inc. (TEMA)
  24. Heat Exchanger Institute (HEI)
  25. Hydraulic Institute (HI)
  26. Thermal Insulation Manufacturer=s Association (TIMA)
  27. Scientific Apparatus Makers Association (SAMA)
- B. Compliance Verification:
1. All items required by code or specified to conform to the ASME code shall be stamped with the ASME seal.
  2. Form U-1, the manufacturer=s data report for pressure vessels, is to be included in the Operation and Maintenance Manuals. National Board Register (NBR) numbers shall be provided where required by code.
  3. Manufactured equipment which is represented by a UL classification and/or listing, shall bear the UL or equivalent ETL label.

## 1.5 UTILITIES &amp; FEES

- A. All fees for permits required by this work will be paid by this division. The contractor shall obtain the necessary permits to perform this work. Unless noted otherwise, all systems furnished and or installed by this Contractor, shall be complete with all utilities, components, commodities and accessories required for a fully functioning system. This Contractor shall furnish smoke generators when required for testing, furnish glycol for glycol piping systems, full load of salt to fill brine tank for water softening system, furnish cleaners and water treatment additives.

## 1.6 SUBMITTALS AND SHOP DRAWINGS

- A. General: As soon as possible after the contract is awarded, but in no case more than 45 calendar days thereafter, the Contractor shall submit to the Architect manufacturer's data on products and materials to be used in the installation of mechanical systems for this project. The review of the submitted data will require a minimum of **14 days**. The first day starts after the day they are received in the engineer's office to which the project is being constructed from. If the Contractors schedule requires return of submitted literature in less than the allotted time, the Contractor shall accelerate his submittal delivery date. The Contractor shall resubmit all items requiring re-review within **14 days** of returned submittals. Refer to each specification section for items requiring submittal review. **If the re-submittal is returned a 2<sup>nd</sup> time for correction the Contractor will provide the specific equipment that is specified on the drawings and/or the specifications.** Written approval of the Owner's Representative shall be obtained before installing any such equipment or materials for the project.
- B. Review by the Owner's Representative is for general conformance of the submitted equipment to the project specification. **In no way** does such review relieve this Contractor of his obligation to furnish equipment and materials that comply in detail to the specification **nor does it relieve** the Contractor of his obligation to determine actual field dimensions and conditions that may affect his work. **Regardless of any items overlooked** by the submittal review, the requirements of the contract drawings and specifications **must be followed** and are not waived or superseded **in any way** by the review.
- C. By description, catalog number, and manufacturer's names, standards of quality have been established by the Architect and the Engineer for certain manufactured equipment items and specialties that are to be furnished by this Division. Alternate products and equipment may be proposed for use only if specifically named in the specifications or if given written prior approval in published addenda. Design equipment is the equipment listed on the drawings or if not listed on the drawings is the equipment first named in the specifications.
- D. If the Engineer is required to do additional design work to incorporate changes caused by submitting equipment or products, different than the design equipment specified, as defined above, the contractor shall reimburse the engineer for additional time and expenses at the engineer's current, recognized, hourly rates.
- E. Submittal Format: At the contractor's discretion, project submittals may be in either of the formats described in the following paragraphs, but mixing the two formats is not acceptable.

1. Hardcopy Submittal Format: **Six (6)** copies of the descriptive literature covering products and materials to be used in the installation of mechanical systems for this project will be provided for review. The submittals shall be prepared in an orderly manner, contained in a 3-ring loose-leaf binder with index and identification tab for each item or group of items and for each specification section. All items shall be submitted at one time except automatic temperature control drawings and seismic restraint drawings which may be submitted separately within **120 days** of the contract award date. Partial submittals will not be reviewed until the complete submittal is received.
  - a. Submitted literature shall bear the Contractor's stamp, indicating that he has checked all equipment being submitted; that each item will fit into the available space with the accesses shown on the drawings; and, further, that each item conforms to the capacity and quality standards given in the contract documents.
  - b. Submitted literature shall clearly indicate performance, quality, and utility requirements; shall show dimension and size of connection points; and shall include derating factors that were applied for each item of equipment to provide capacity at job site elevation. Temperature control submittals shall include piping and wiring diagrams, sequence of operation and equipment. Equipment must fit into the available space with allowance for operation, maintenance, etc. Factory piped and wired equipment shall include shop drawings for all internal wiring and piping furnished with the unit.
  - c. Submitted literature shall clearly show all required field install wiring, piping, and accessory installations required by the Contractor to provide a complete operating system.
  
2. Electronic Submittal Format: Identify and incorporate information in each electronic submittal file as follows:
  - a. All items shall be submitted at one time except automatic temperature control drawings and seismic restraint drawings which may be submitted separately within **120 days** of the contract award date. Partial submittals will not be reviewed until the complete submittal is received.
  - b. Submitted electronic file shall bear the Contractor's stamp, indicating that he has checked all equipment being submitted; that each item will fit into the available space with the accesses shown on the drawings; and, further, that each item conforms to the capacity and quality standards given in the contract documents.
  - c. Submitted electronic file shall clearly indicate performance, quality, and utility requirements; shall show dimension and size of connection points; and shall include derating factors that were applied for each item of equipment to provide capacity at job site elevation. Temperature control submittals shall include piping and wiring diagrams, sequence of operation and equipment. Equipment must fit into the available space with allowance for operation, maintenance, etc. Factory piped and wired equipment shall include shop drawings for all internal wiring and piping furnished with the unit.
  - d. Submitted electronic file shall clearly show all required field install wiring, piping, and accessory installations required by the Contractor to provide a complete operating system.
  - e. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.



- f. Name file with submittal number or other unique identifier, including revision identifier.
- g. Electronic file shall be completely electronically searchable or it will be rejected.**
- h. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by:
  - 1) Architect.**
- i. Transmittal Form for Electronic Submittals:
  - 1) Use one of the following options acceptable to the Owner;
    - a) Software-generated form from electronic project management software.**
    - b) Electronic form.**
  - 2) The Electronic Submittal shall contain the following information:
    - a) Project name.
    - b) Date.
    - c) Name and address of Architect.
    - d) Name of Construction Manager.
    - e) Name of Contractor.
    - f) Name of firm or entity that prepared submittal.
    - g) Names of subcontractor, manufacturer, and supplier.
    - h) Category and type of submittal.
    - i) Submittal purpose and description.
    - j) Specification Section number and title.
    - k) Specification paragraph number or drawing designation and generic name for each of multiple items.
    - l) Drawing number and detail references, as appropriate.
    - m) Location(s) where product is to be installed, as appropriate.
    - n) Related physical samples submitted directly.
    - o) Indication of full or partial submittal.
    - p) Transmittal number[, numbered consecutively].
    - q) Submittal and transmittal distribution record.
    - r) Other necessary identification.
    - s) Remarks.
- j. Metadata: Include the following information as keywords in the electronic submittal file metadata:
  - 1) Project name.
  - 2) Number and title of appropriate Specification Section.
  - 3) Manufacturer name.
  - 4) Product name.

## 1.7 DRAWINGS AND MEASUREMENTS

- A. Construction Drawings: The contract document drawings show the general design, arrangements, and extent of the system. In certain cases, the drawings may include details that show more nearly exact locations and arrangements; however, the locations, as shown diagrammatically, are to be regarded as general.

- B. It shall be the work of this Section to make such slight alterations as may be necessary to make adjustable parts fit to fixed parts, leaving all complete and in proper shape when done. All dimensions given on the drawings shall be verified as related to this work and with the Architect's office before work is started.
- C. This Section shall carefully study building sections, space, clearances, etc., and then provide offsets in piping or ductwork as required to accommodate the building structure without additional cost to the Owner. In any case and at any time during the construction process, a change in location required by obstacles or the installation of other trades not shown on the mechanical plans shall be made without charge.
- D. The drawings shall not be scaled for roughing in measurements nor shall they be used as shop drawings. Where drawings are required for these purposes or where drawings must be made from field measurements, the Contractor shall take the necessary measurements and prepare the drawings. Shop drawings of the various subcontractors shall be coordinated to eliminate all interferences and to provide sufficient space for the installation of all equipment, piping, ductwork, etc.
- E. The drawings and specifications have been prepared to supplement each other and they shall be interpreted as an integral unit with items shown on one and not the other being furnished and installed as though shown and called out on both.
- F. Coordination Drawings: The contractor shall provide coordination drawings for mechanical rooms, fan rooms, equipment rooms, and congested areas to eliminate conflicts with equipment, piping, or work of other trades. The drawings shall be a minimum scale of 1/4 inch= 1 foot and of such detail as may be required by the Engineer to fully illustrate the work. These drawings shall include all piping, conduit, valves, equipment, and ductwork.
- G. Sheet-metal shop drawings will be required for all ductwork in the entire building. These drawings will show all ductwork in the entire building and shall be coordinated with architectural, structural and electrical portions of the project. The contractor shall specifically obtain copies of the structural shop drawings and shall coordinate the ductwork shop drawings with approved structural members. These drawings shall be submitted to the engineer for review prior to any fabrication. The contractor is responsible for all modifications necessary to accommodate duct installation within the structural, architectural and electrical restrictions. These drawings, once reviewed by the engineer, will be made available to all mechanical, electrical, and fire sprinkler subcontractors to coordinate installation of their work.

#### 1.8 CONTRACTOR'S USE OF BUILDING EQUIPMENT

- A. The Contractor may use equipment such as electric motors, fans, heat exchangers, filters, etc., with the written permission of the Owner. As each piece of equipment is used (such as electric motors and fans), maintenance procedures approved by the manufacturer are to be followed. A careful record is to be kept of the length of the time the equipment is used, maintenance procedures followed, and any difficulty encountered. The record is to be submitted to the Owner upon acceptance. All fan belts and filter media (such as bearings) shall be carefully inspected just prior to acceptance. Any excessive wear noted shall require replacement. New filter media shall be installed in air handlers at the time systems are turned over to the owner.

## 1.9 EXISTING CONDITIONS

- A. The Contractor shall carefully examine all existing conditions that might affect the mechanical system and shall compare these conditions with all drawings and specifications for work included under this contract. He shall, at such time, ascertain and check all conditions that may affect his work. No allowance shall subsequently be made in his behalf for an extra expense incurred as a result of his failure or neglect to make such examination. This Contractor shall include in his bid proposal all necessary allowances to repair or replace any item that will remain or will be removed, and any item that will be damaged or destroyed by new construction.
- B. The Contractor shall remove all abandoned piping, etc., required by new construction and cap or plug openings. No capping, etc., shall be exposed in occupied areas. All openings of items removed shall be sealed to match adjacent surfaces.
- C. The Contractor shall verify the exact location of all existing services, utilities, piping, etc., and make connections to existing systems as required or as shown on the drawings. The exact location of each utility line, together with size and elevation, shall be established before any on-site lines are installed. Should elevation or size of existing main utility lines make connections to them impossible as shown on drawings, then notification of such shall immediately be given to the Owners Representative for a decision.

## 1.10 EQUIPMENT CAPACITIES

- A. Capacities shown for equipment in the specifications and on the drawings are the minimum acceptable. No equipment shall be considered as an alternate that has capacities or performance less than that of design equipment.
- B. All equipment shall give the specified capacity and performance at the job-site elevation. Manufacturers' standard ratings shall be adjusted accordingly. All capacities and performances listed on drawings or in specifications are for job-site conditions.

## 1.11 SEISMIC REQUIREMENTS FOR EQUIPMENT

- A. All equipment shall be furnished structurally adequate to withstand seismic forces as outlined in the International Building Code. Refer to section Mechanical Vibration Controls and Seismic Restraints. Equipment bases shall be designed for direct attachment of seismic snubbers and/or seismic anchors.

## 1.12 COOPERATION WITH OTHER TRADES

- A. The Contractor shall refer to other drawings and parts of this specification that cover work of other trades that is carried on in conjunction with the mechanical work such that all work can proceed without interference resulting from lack of coordination.
- B. The Contractor shall properly size and locate all openings, chases, sleeves, equipment bases, and accesses. He shall provide accurate wiring diagrams to the Electrical Contractor for all equipment furnished under this Division.

- C. The ceiling cavity must be carefully reviewed and coordinated with all trades. In the event of conflict, the installation of the mechanical equipment and piping shall be in the following order: plumbing, waste, and soil lines; supply, return, and exhaust ductwork; water piping; medical gases; fire protection piping; and pneumatic control piping.
- D. The mechanical Contractor shall insure that the installation of all piping, ducts and equipment is in compliance with Articles 110-16 and 384-4 of the National Electrical Code relative to proper clearances in front of and over all electrical panels and equipment. No piping or ductwork will be allowed to run over electrical panel.

#### 1.13 RESPONSIBILITY OF CONTRACTOR

- A. The Contractor is responsible for the installation of a satisfactory piece of work in accordance with the true intent of the drawings and specifications. He shall provide, as a part of his work and without expense, all incidental items required even though these items are not particularly specified or indicated. The installation shall be made so that its several component parts will function together as a workable system and shall be left with all equipment properly adjusted and in working order. The Contractor shall familiarize the Owner's Representative with maintenance and lubrication instructions as prepared by the Contractor and shall explain and fully instruct him relative to operating, servicing, and maintenance of them.
- B. If a conflict arises between the drawings and the specifications the most stringent procedure/action shall be followed. A clarification to the engineer will help to determine the course of action to be taken. If a conflict arises between specification sections the engineer will determine which course of action is to be followed.

#### 1.14 PIPE AND DUCT OPENINGS AND EQUIPMENT RECESSES

- A. Pipe and duct chases, openings, and equipment recesses shall be provided by others only if shown on architectural or structural drawings. All openings for the mechanical work, except where plans and specifications indicate otherwise, shall be provided as work of this Division. Include openings information with coordination drawings.
- B. Whether chases, recesses, and openings are provided as work of this Division or by others, this Contractor shall supervise their construction and be responsible for the correct size and location even though detailed and dimensioned on the drawings. This Contractor shall pay for all necessary cutting, repairing, and finishing if any are left out or incorrectly made. All necessary openings thru existing walls, ceilings, floors, roofs, etc. shall be provided by this Contractor unless indicated otherwise by the drawing and/or specifications.

#### 1.15 UNFIT OR DAMAGED WORK

- A. Any part of this installation that fails, is unfit, or becomes damaged during construction, shall be replaced or otherwise made good. The cost of such remedy shall be the responsibility of this Division.

## 1.16 WORKMANSHIP

- A. Workmanship shall be the best quality of its kind for the respective industries, trades, crafts, and practices, and shall be acceptable in every respect to the Owner's representative. Nothing contained herein shall relieve the Contractor from making good and perfect work in all details in construction.

## 1.17 SAFETY REGULATION

- A. The Contractor shall comply with all local, Federal, and OSHA safety requirements in performance with this work. (See General Conditions). This Contractor shall be required to provide equipment, supervision, construction, procedures, and all other necessary items to assure safety to life and property.

## 1.18 ELECTRICAL SERVICES

- A. All equipment control wiring and all automatic temperature control wiring including all necessary contacts, relays, and interlocks, whether low or line voltage, except power wiring, shall be furnished and installed as work of this Division unless shown to be furnished by Division 26. All such wiring shall be in conduit as required by electrical codes. Wiring in the mechanical rooms, fans rooms and inaccessible ceilings and walls shall be installed in conduit as well. Installation of any and all wiring done under Division 21, 22 and 23 shall be in accordance with the requirements of Division 26, Electrical.
- B. All equipment that requires an electrical connection shall be furnished so that it will operate properly and deliver full capacity on the electrical service available.
- C. Refer to the electrical control equipment and wiring shown on the diagrams. Any changes or additions required by specific equipment furnished shall be the complete responsibility of the Contractor furnishing the equipment.
- D. The Mechanical Contractor must coordinate with the Electrical Contractor to insure that all required components of control work are included and fully understood. No additional cost shall accrue to the Owner as a result of lack of such coordination.

## 1.19 WORK, MATERIALS, AND QUALITY OF EQUIPMENT

- A. Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and all labor shall be done in a most thorough and workmanlike manner.
- B. Products or equipment of any of the manufacturers cited herein or any of the products approved by the Addenda may be used. However, where lists of products are cited herein, the one first listed in the design equipment used in drawings and schedules to establish size, quality, function, and capacity standards. If other than design equipment is used, it shall be carefully checked for access to equipment, electrical and control requirements, valving, and piping. Should changes or additions occur in piping, valving, electrical work, etc., or if the work of other Contractors would be revised by the alternate equipment, the cost of all changes shall be borne as work of this Division.

- C. The Execution portions of the specifications specify what products and materials may be used. Any products listed in the Product section of the specification that are not listed in the Execution portion of the specification may not be used without written approval by the Engineer.
- D. The access to equipment shown on the drawings is the minimum acceptable space requirements. No equipment that reduces or restricts accessibility to this or any other equipment will be considered.
- E. All major items of equipment are specified in the equipment schedules on the drawings or in these specifications and shall be furnished complete with all accessories normally supplied with the catalog item listed and all other accessories necessary for a complete and satisfactory installation.
- F. All welders shall be certified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code, latest Edition.

#### 1.20 PROTECTION AGAINST WEATHER AND STORING OF MATERIALS

- A. All equipment and materials shall be properly stored and protected against moisture, dust, and wind. Coverings or other protection shall be used on all items that may be damaged or rusted or may have performance impaired by adverse weather or moisture conditions. Damage or defect developing before acceptance of the work shall be made good at the Contractor's expense.
- B. All open duct and pipe openings shall be adequately covered at all times.

#### 1.21 INSTALLATION CHECK

- A. An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment indicated in the equipment schedule and the seismic supplier shall visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The equipment supplier's representative shall revisit the job site as often as necessary until all trouble is corrected and the equipment installation and operation is satisfactory to the Engineer.
- B. Each equipment supplier's representative shall furnish to the Owner, through the Engineer, a written report certifying that the equipment (1) has been properly installed and lubricated; (2) is in accurate alignment; (3) is free from any undue stress imposed by connecting piping or anchor bolts; and, (4) has been operated under full load conditions and that it operated satisfactorily.
- C. All costs for this work shall be included in the prices quoted by equipment suppliers.

#### 1.22 EQUIPMENT LUBRICATION

- A. The Contractor shall properly lubricate all pieces of equipment before turning the building over to the Owner. A linen tag shall be attached to each piece of equipment, showing

the date of lubrication and the lubricant used. No equipment shall be started until it is properly lubricated.

- B. Necessary time shall be spent with the Owner's Representative to thoroughly familiarize him with all necessary lubrications and maintenance that will be required of him.
- C. Detergent oil as used for automotive purposes shall not be used for this work.

#### 1.23 CUTTING AND PATCHING

- A. No cutting or drilling in structural members shall be done without written approval of the Architect. The work shall be carefully laid out in advance, and cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces necessary for the mechanical work shall be carefully done. Any damage to building, piping, or equipment shall be repaired by professional plasterers, masons, concrete workers, etc., and all such work shall be paid for as work of this Division.
- B. When concrete, grading, etc., is disturbed, it shall be restored to original condition as described in the applicable Division of this Specification.

#### 1.24 EXCAVATION AND BACKFILLING

- A. All necessary excavations and backfilling for the Mechanical phase of this project shall be provided as work of this Division. Trenches for all underground pipelines shall be excavated to the required depths. The bottom of trenches shall be compacted hard and graded to obtain required fall. Backfill shall be placed in horizontal layers, not exceeding 12 inches in thickness, and properly moistened. Each layer shall be compacted, by suitable equipment, to a density of not less than 95 percent as determined by ASTM D-1557. After pipelines have been tested, inspected, and approved, the trench shall be backfilled with selected material. Excess earth shall be hauled from the job site. Fill materials approved by the Architect shall be provided as work of this Division.
- B. No trenches shall be cut near or under any footings without consultation first with the Architect's office. Any trenches or excavations more than 30 inches deep shall be tapered, shored, covered, or otherwise made absolutely safe so that no vehicle or persons can be injured by falling into such excavations, or in any way be harmed by cave-ins, shifting earth, rolling rocks, or by drowning. This protection shall be extended to all persons approaching excavation related to this work whether or not such persons are authorized to be in the vicinity of the construction.

#### 1.25 ACCESS

- A. Provide access doors in walls, ceilings and floors by this division unless otherwise noted. For access to mechanical equipment such as valves, dampers, VAV boxes, fans, controls, etc. Refer to Division 8 for door specifications. All access doors shall be 24" x 24" unless otherwise indicated or required. Coordinate location of doors with the Architect prior to installation. . If doors are not specified in Division 8, provide the following: Doors in ceilings and wall shall be equal to JR Smith No. 4760 bonderized and painted. Doors in tile walls shall be equal to JR Smith No. 4730 chrome plated. Doors in floors shall be equal to JR Smith No. 4910

- B. Valves: Valve must be installed in locations where access is readily available. If access is compromised, as judged by the Mechanical Engineer, these valves shall be relocated where directed at the Contractors expense.
- C. Equipment: Equipment must be installed in locations and orientations so that access to all components requiring service or maintenance will not be compromised. If access is compromised, as judged by the Mechanical Engineer, the contractor shall modify the installation as directed by the Engineer at the Contractors expense.
- D. It is the responsibility of this division to install terminal boxes, valves and all other equipment and devices so they can be accessed. If any equipment or devices are installed so they cannot be accessed on a ladder a catwalk and ladder system shall be installed above the ceiling to access and service this equipment.

#### 1.26 CLEANING AND PAINTING

- A. Cleaning: After all tests and adjustments have been made and all systems pronounced satisfactory for permanent operation, this Contractor shall clean all exposed piping, ductwork, insulated members, fixture, and equipment installed under this Section and leave them ready for painting. He shall refinish any damaged finish and leave everything in proper working order. The Contractor shall remove all stains or grease marks on walls, floors, glass, hardware, fixtures, or elsewhere, caused by his workman or for which he is responsible. He shall remove all stickers on plumbing fixtures, do all required patching up and repair all work of others damaged by this division of the work, and leave the premises in a clean and orderly condition.
- B. Painting: Painting of exposed pipe, insulated pipe, ducts, or equipment is work of Division 9, Painting.
- C. Mechanical Contractor: All equipment which is to be furnished in factory prefinished conditions by the mechanical Contractor shall be left without mark, scratch, or impairment to finish upon completion of job. Any necessary refinishing to match original shall be done. Do not paint over nameplates, serial numbers, or other identifying marks.
- D. Removal of Debris, Etc: Upon completion of this division of the work, remove all surplus material and rubbish resulting from this work, and leave the premises in a clean and orderly condition.

#### 1.27 CONTRACT COMPLETION

- A. Incomplete and Unacceptable Work: If additional site visits or design work is required by the Engineer or Architect because of the use of incomplete or unacceptable work by the Contractor, then the Contractor shall reimburse the Engineer and Architect for all additional time and expenses involved.
- B. Maintenance Instructions: The Contractor shall furnish the Owner complete printed and illustrated operating and maintenance instructions covering all units of mechanical equipment, together with parts lists.
- C. Instructions To Owner's Representatives: In addition to any detailed instructions called for, the mechanical Contractor must provide, without expense to the Owner, competent



instructors to train the Owner's representatives who will be in charge of the apparatus and equipment, in the care, adjustment, and operation of all parts on the heating, air conditioning, ventilating, plumbing, fire protection, and automatic temperature control equipment. Instruction dates shall be scheduled at time of final inspection. A written report specifying times, dates, and name of personnel instructed shall be forwarded to the Architect. A minimum of four 8-hour instruction periods shall be provided. The instruction periods will be broken down to shorter periods when requested by the Owner. The total instruction hours shall not be reduced. The ATC Contractor shall provide 4 hours of instructions. The remaining hours shall be divided between the mechanical and sheet metal Contractor.

- D. Guarantee: By the acceptance of any contract award for the work herein described or shown on the drawings, the Contractor assumes the full responsibility imposed by the guarantee as set forth herein and in the General Conditions, and should protect himself through proper guarantees from equipment and special equipment Contractors and from subcontractors as their interests may appear.
- E. The guarantee so assumed by the Contractor and as work of this Section is as follows:
1. That the entire mechanical system, including plumbing, heating, and air-conditioning system shall be quiet in operation.
  2. That the circulation of water shall be complete and even.
  3. That all pipes, conduit, and connections shall be perfectly free from foreign matter and pockets and that all other obstructions to the free passage of air, water, liquid, sewage, and vent shall be removed.
  4. That he shall make promptly and free of charge, upon notice from the Owner, any necessary repairs due to defective workmanship or materials that may occur during a period of one year from date of Substantial Completion.
  5. That all specialties, mechanical, and patent devices incorporated in these systems shall be adjusted in a manner that each shall develop its maximum efficiency in the operation of the system; i.e., diffusers shall deliver the designed amount of air shown on drawings, thermostats shall operate to the specified limits, etc.
  6. All equipment and the complete mechanical, ductwork, piping and plumbing systems shall be guaranteed for a period of one year from the date of the Architect's Certificate of Substantial Completion, this includes all mechanical, ductwork, piping and plumbing equipment and products and is not limited to boiler, chillers, coils, fans, filters etc. Any equipment supplier not willing to comply with this guarantee period shall not submit a bid price for this project. The Contractor shall be responsible for a 100-percent guarantee for the system and all items of equipment for this period. If the contractor needs to provide temporary heating or cooling to the building and or needs to insure systems are installed properly and or to meet the project schedule the guaranteed of all systems and equipment shall be as indicated above, on year from the date of the Architect's Certificate of Substantial Completion.
  7. All filters used during construction shall be replaced just before equipment is turned over to the Owner, and all required equipment and parts shall be oiled. Any worn parts shall also be replaced.
  8. If any systems or equipment is used for temporary heating or cooling the systems shall be protected so they remain clean. I.e. if the ductwork systems are used temporary filters and a filter holder (not duct-taped to ducts or grilles) shall be installed to insure the systems and the equipment remain clean.

## 1.28 TEST RUN

- A. The Mechanical Contractor shall operate the mechanical system for a minimum of 30 days to prove the operation of the system.

## 1.29 EQUIPMENT STARTUP AND CHECKOUT:

- A. Each major piece of equipment shall be started and checked out by an authorized representative of the equipment manufacturer. A certificate indicating the equipment is operating to the satisfaction of the manufacturer shall be provided and shall be included in the commissioning report.
- B. This contractor shall coordinate commissioning procedures and activities with the commissioning agent.

## 1.30 DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
- B. Proceed with demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- C. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
- D. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
- E. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
- F. Maintain adequate ventilation when using cutting torches.
- G. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
- H. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- I. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- J. Dispose of demolished items and materials promptly.

- K. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- L. Existing Facilities: Comply with building manager's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.
- M. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
- N. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- O. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- P. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

END OF SECTION

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**SECTION 230150 – TEMPORARY USE OF EQUIPMENT AND SYSTEMS**

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This section includes requirements for temporary use of equipment and systems and any other items that are used during the construction of the project.

## 1.2 EQUIPMENT OR SYSTEMS NEEDED TO OPERATE BEFORE CONTRACT COMPLETION

- A. If the contractor needs to provide temporary heating or cooling to the building and or needs to insure systems are installed properly for start up and or to meet the project schedule the guaranteed of all systems and equipment shall be for one year from the date of the Architect's Certificate of Substantial Completion.

All equipment and the complete mechanical, ductwork, piping and plumbing systems shall be guaranteed for a period of one year from the date of the Architect's Certificate of Substantial Completion, this includes all mechanical, ductwork, piping and plumbing equipment and products and is not limited to boiler, chillers, coils, fans, filters etc. Any contractor or equipment supplier who is not willing to comply with this guarantee period shall not submit a bid price for this project. The Contractor shall be responsible for a 100-percent guarantee for the systems and all items of equipment for this period.

All filters used during construction shall be replaced just before equipment is turned over to the Owner, and all required equipment and parts shall be oiled. Any worn parts shall also be replaced.

If any systems or equipment is used for temporary heating or cooling the systems shall be protected so they remain clean. I.e. if the ductwork systems are used temporary filters and a filter holder (not duct-taped to ducts or grilles) shall be installed to insure the systems and the equipment remain clean. All return air openings shall be protected with a metal filter frame and filters.

## 1.3 TEMPORARY EQUIPMENT OR SYSTEM SUBMITTALS

- A. If it is determined by the project or contractor that equipment or systems are needed to operate to provide heating, cooling or other needed services this division shall submit a document indicating what measures will be taken to insure the safe and proper operation of the equipment, systems and personal associated with the operation, this document shall be submitted to the engineer for approval. This plan shall show connections of equipment, utility hookups (if required) staging areas etc.

## 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
- D. SMACNA: The latest standard from SSMACNA shall apply.

## 1.5 PROJECT CONDITIONS

- A. Temporary Use of equipment or systems: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use until the facility has been accepted by the owner regardless of previously assigned responsibilities.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters and cooling units if required with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filters with MERV of **8** at each return air opening in system and remove at end of construction. These filters are to be installed in a filter housing frame and are not to be duct taped. Clean HVAC system as required in Division 01 Section "Closeout Procedures."

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate equipment where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify equipment and systems as required by progress of the Work.
  - 1. Locate equipment to limit site disturbance as specified in Division 01 Section "Summary."

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- C. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

### 3.3 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain equipment and systems in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar equipment and systems on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- B. Termination and Removal: Remove each temporary facility or equipment when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials equipment that constitute temporary equipment are property of Contractor.
  - 2. At Substantial Completion, repair, renovate, and clean permanent equipment and systems used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

### 3.4 EQUIPMENT STARTUP AND CHECKOUT:

- A. Each major piece of equipment shall be started and checked out by an authorized representative of the equipment manufacturer at substantial completion. A certificate indicating the equipment is operating to the satisfaction of the manufacturer shall be provided and shall be included in the commissioning report.

END OF SECTION



**SECTION 230500 - COMMON WORK RESULTS FOR HVAC**

## 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:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Transition fittings.
  - 3. Dielectric fittings.
  - 4. Sleeves.
  - 5. Escutcheons.
  - 6. Equipment installation requirements common to equipment sections.
  - 7. Painting and finishing.

## 1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, and crawlspaces.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces, mechanical equipment rooms, accessible pipe shafts, accessible plumbing chases, and accessible tunnels.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
  - 1. CPVC: Chlorinated polyvinyl chloride plastic.
  - 2. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

##### A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Escutcheons.

##### B. Welding certificates.

#### 1.5 QUALITY ASSURANCE

##### A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

##### B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

##### C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

##### A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

##### B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

#### 1.7 COORDINATION

##### A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

##### B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

- C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

### 2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. ASME B16.21, nonmetallic, flat, asbestos-free, **1/8-inch** maximum thickness unless thickness or specific material is indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  - 2. AWWA C110, rubber, flat face, **1/8 inch** thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

## 2.4 TRANSITION FITTINGS

- A. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
  - 1. Manufacturers:
    - a. Eslon Thermoplastics.
- B. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
  - 1. Manufacturers:
    - a. Thompson Plastics, Inc.

## 2.5 DIELECTRIC FITTINGS

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for **250-psig** minimum working pressure at **180 deg F**.
- E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for **150-** or **300-psig** minimum working pressure as required to suit system pressures.
- F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
  - 1. Provide separate companion flanges and steel bolts and nuts for **150-** or **300-psig** minimum working pressure as required to suit system pressures.
- G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and **300-psig** minimum working pressure at **225 deg F**.
- H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and **300-psig** minimum working pressure at **225 deg F**.
  - 1. Manufacturers:

- a. Capitol Manufacturing Co.
- b. Central Plastics Company.
- c. Watts Industries, Inc.; Water Products Div

## 2.6 SLEEVES

- A. Galvanized-Steel Sheet: **0.0239-inch** minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.

## 2.7 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  1. Finish: Polished chrome-plated and rough brass.
- D. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.
- E. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.

## 2.8 GROUT

- A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
  1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: **5000-psi**, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

### PART 3 - EXECUTION

#### 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, 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.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
  1. New Piping:
    - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.

- c. Insulated Piping: One-piece, stamped-steel type with spring clips.
  - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
  - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
  - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
  - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge and set screw.
- M. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- 1. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
  - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
  - 3. Install sleeves that are large enough to provide **1/4-inch** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    - a. PVC Steel Pipe Sleeves: For pipes smaller than **NPS 6**.
    - b. Steel Sheet Sleeves: For pipes **NPS 6** and larger, penetrating gypsum-board partitions.
    - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches** above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
      - 1) Seal space outside of sleeve fittings with grout.
  - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- P. Verify final equipment locations for roughing-in.
- Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

### 3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping **NPS 2** and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping **NPS 2-1/2** and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
  - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.



### 3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

### 3.5 PAINTING

- A. Painting of HVAC systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

END OF SECTION

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**SECTION 230548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC**

## 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 SCOPE

- A. Provide engineered vibration isolation and restraint systems in accordance with the requirements of this section including design, engineering, materials, testing, inspections and reports.
- B. All mechanical equipment, piping and ductwork shall be restrained as required by Federal, State and Local building codes to preserve the integrity of nonstructural building components during **seismic** events to minimize hazards to occupants and reduce property damage.

## 1.3 SUMMARY

- A. This Section includes the following:
  - 1. Resilient pipe guides.
  - 2. Elastomeric hangers.
  - 3. Spring hangers.
  - 4. Snubbers.
  - 5. Restraint channel bracings.
  - 6. Restraint cables.
  - 7. Seismic-restraint accessories.
  - 8. Mechanical anchor bolts.
  - 9. Adhesive anchor bolts.
  - 10. Certification of **seismic** restraint designs.
  - 11. Installation supervision.
  - 12. All components requiring IBC compliance and certification.
  - 13. All inspection and test procedures for components requiring IBC compliance.
  - 14. Restraint of all mechanical equipment, pipe and ductwork, within, on, or outdoors of the building and entry of services to the building, up to but not including, the utility connection, is part of this Specification.
  - 15. Seismic certification of equipment

## 1.4 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.

- C. ASCE: American Society of Civil Engineers
- D. OSHPD: Office of Statewide Health Planning and Development for the State of California.
- E. Ip: Importance Factor.
- F. ESSENTIAL FACILITIES, (Occupancy Category IV, IBC-2012)
  - 1. Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from flood, wind, snow or earthquakes.
- G. LIFE SAFETY
  - 1. All systems involved with fire protection, including sprinkler piping, jockey pumps, fire pumps, control panels, service water supply piping, water tanks, fire dampers, smoke exhaust systems and fire alarm panels.
  - 2. All mechanical, electrical, plumbing or fire protection systems that support the operation of, or are connected to, emergency power equipment, including all lighting, generators, transfer switches and transformers.
  - 3. All medical and life support systems.
  - 4. Hospital heating systems and air conditioning systems for maintaining normal ambient temperature.
  - 5. Automated supply, exhaust, fresh air and relief air systems on emergency control sequence, including air handlers, duct, dampers, etc., or manually-operated systems used for smoke evacuation, purge or fresh air relief by the fire department.
  - 6. Heating systems in any facility with Occupancy Category IV, IBC-2009 where the ambient temperature can fall below 32 degrees Fahrenheit.
- H. HIGH HAZARD
  - 1. All gases or fluids that must be contained in a closed system which are flammable or combustible. Any gas that poses a health hazard if released into the environment and vented Fuel Cells.

#### 1.5 REFERENCE CODES AND STANDARDS

- A. Codes and Standards: The following shall apply and conform to good engineering practices unless otherwise directed by the Federal, State or Local authorities having jurisdiction.
  - 1. IBC
  - 2. ASCE 7
  - 3. NFPA 13 (National Fire Protection Association)
  - 4. IBC 2018 replaces all references to IBC 2006, 2009.

- B. The following guides may be used for supplemental information on typical seismic installation practices. Where a conflict exists between the guides and these construction documents, the construction documents will preside.
1. FEMA (Federal Emergency Management Agency) manuals 412, Installing Seismic Restraints for Mechanical Equipment and 414, Installing Seismic Restraints for Ductwork and Pipe.
  2. SMACNA (Sheet Metal and Air-conditioning Contractors' National Association) Seismic Restraint Manual Guidelines for Mechanical Systems, 3rd ed.
  3. ASHRAE (American Society for Heating, Refrigerating and Air-conditioning Engineers) A Practical Guide to Seismic Restraint
  4. MSS (Manufacturers Standardization Society of the Valve and Fittings Industry) MSS SP-127, Bracing for Piping Systems, Seismic – Wind – Dynamic, Design, Selection, Application.

#### 1.6 ISOLATOR AND RESTRAINT MANUFACTURER'S RESPONSIBILITIES:

- A. Provide project specific vibration isolation and seismic restraint design prepared by a registered design professional in the state where the project is being constructed, and manufacturer certifications that the components are seismically qualified.
1. Provide calculations to determine restraint loads resulting from seismic forces as required by IBC, Chapter 16 and ASCE 7, latest editions. Seismic calculations shall be certified by an engineer licensed in the state where the project is being constructed.
- B. Provide installation instructions and shop drawings for all materials supplied under this section of the specifications.
1. Provide seismic restraint details with specific information relating to the materials, type, size, and locations of anchorages; materials used for bracing; attachment requirements of bracing to structure and component; and locations of transverse and longitudinal sway bracing and rod stiffeners.
  2. Provide seismic bracing layout drawings indicating the location of all seismic restraints.
    - a. Each piece of rotating isolated equipment shall be tagged to clearly identify quantity and size of vibration isolators and seismic restraints.
- C. Provide, in writing, the special inspection requirements for all Designated Seismic Systems as indicated in Chapter 17 of the IBC.
- D. Provide training for installation, operation and maintenance of isolation and restraint systems.

#### 1.7 PERFORMANCE REQUIREMENTS

- A. Flood-Restraint Loading: Per the structural drawings and specifications.
- B. Seismic-Restraint Loading:
1. Site Class as Defined in the IBC: Per the structural drawings and specifications.

2. Assigned Occupancy Category as Defined in the IBC: Per the structural drawings and specifications.
  - a. Component Importance Factor: 1.5.
    - 1) Life safety components required to function after an earthquake.
    - 2) Components containing hazardous or flammable materials in quantities that exceed the exempted amounts for an open system listed in Chapter 4.
    - 3) For structures with an Occupancy Category IV, components needed for continued operation of the facility or whose failure could impair the continued operation of the facility.
    - 4) Storage racks in occupancies open to the general public (e.g., warehouse retail stores).
  - b. Component Importance Factor: 1.0.
    - 1) All other components
  - c. Component Response Modification Factor: Per the structural drawings and specifications.
  - d. Component Amplification Factor: Per the structural drawings and specifications.
3. Design Spectral Response Acceleration at Short Periods: Per the structural drawings and specifications.
4. Design Spectral Response Acceleration at 1-Second Period: Per the structural drawings and specifications.

## 1.8 ACTION SUBMITTALS

### A. Product Data: For the following:

1. Submittals shall include catalog cut sheets and installation instructions for each type of anchor and seismic restraint used on equipment or components being isolated and/or restrained.
2. Submittals for mountings and hangers incorporating springs shall include spring diameter and free height, rated load, rated deflection, and overload capacity for each vibration isolation device.
3. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
  - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an **evaluation service member of ICC-ES**.
  - b. Annotate to indicate application of each product submitted and compliance with requirements.
4. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

### B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. "Basis for Design" report: Statement from the registered design professional that the design complies with the requirements of the ASCE 7-05 Chapter 13, IBC 2009 chapter 1912 and ACI 318. In addition, the basis for compliance must also be noted, as listed below:
    - a. Project specific design documentation prepared and submitted by a registered design professional (ASCE 7, 13.2.1.1)
    - b. Submittal of the manufacturer's certification that the isolation equipment is seismically qualified by:
    - c. An engineered analysis conforming to the requirements of Chapter 13 of ASCE 7.
    - d. Testing by a nationally recognized testing standard procedure such as ICC-ES AC 156. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.
    - e. Experience data conforming to a nationally recognized procedure. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.
  2. Seismic restraint load ratings must be certified and substantiated by testing or calculations under direct control of a registered professional engineer. Copies of testing and calculations must be submitted as part of submittal documents. OSHPD pre-approved restraint systems are exempt from this requirement if their pre-approval is current and based upon the IBC 2009 (i.e. OPA-07 pre-approval numbers).
  3. Include design calculations and details for selecting vibration isolators, seismic restraints, and vibration isolation bases complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  4. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, **seismic** forces required to select vibration isolators, **seismic** restraints, and for designing vibration isolation bases.
    - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Division 23 Sections for equipment mounted outdoors.
  5. **Seismic**-Restraint Details:
    - a. Design Analysis: To support selection and arrangement of **seismic** restraints. Include calculations of combined tensile and shear loads.
    - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment

locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.

- c. Preapproval and Evaluation Documentation: By **an evaluation service member of ICC-ES**, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

#### 1.9 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.
  1. Submittal drawings and calculations must be stamped by a registered professional engineer in the State where the project is being constructed who is responsible for the seismic restraint design.
  2. Calculations and restraint device submittal drawings shall specify anchor bolt type, embedment, concrete compressive strength, minimum spacing between anchors, and minimum distances of anchors from concrete edges. Concrete anchor locations shall not be near edges, stress joints, or an existing fracture. All bolts shall be ASTM A307 or better.
- B. Qualification Data: For professional engineer and testing agency.
- C. Welding certificates.
- D. Field quality-control test reports.

#### 1.10 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.



## 1.11 SEISMIC CERTIFICATION OF EQUIPMENT

- A. Component Importance Factor. All plumbing and mechanical components shall be assigned a component importance factor. The component importance factor,  $I_p$ , shall be taken as 1.5 if any of the following conditions apply:
1. The component is required to function for life-safety purposes after an earthquake.
  2. The component contains hazardous materials.
  3. The component is in or attached to an Occupancy Category IV structure and it is needed for continued operation of the facility or its failure could impair the continued operation of the facility.
- B. All other components shall be assigned a component importance factor,  $I_p$ , equal to 1.0.
- C. For equipment or components where  $I_p = 1.0$ .
1. Submit manufacturer's certification that the equipment is seismically qualified by:
    - a. An engineered analysis conforming to the requirements of Chapter 13 of ASCE 7.
    - b. Testing by a nationally recognized testing standard procedure such as ICC-ES AC 156. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.
    - c. Experience data conforming to a nationally recognized procedure. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.
  2. The equipment and components listed below are considered rugged and shall not require Special Seismic Certification:
    - a. Valves (not in cast-iron housings, except for ductile cast iron).
    - b. Pneumatic operators.
    - c. Hydraulic operators.
    - d. Motors and motor operators.
    - e. Horizontal and vertical pumps (including vacuum pumps).
    - f. Air compressors
    - g. Refrigerators and freezers.
    - h. Elevator cabs.
    - i. Underground tanks.
    - j. Equipment and components weighing not more than 20 lbs. supported directly on structures (and not mounted on other equipment or components) with supports and attachments in accordance with Chapter 13, ASCE 7.
  3. Rugged equipment and components in this section are for factory assembled discrete equipment and components only and do not apply to site assembled or field assembled equipment or equipment anchorage. The list is based in part on OSHPD Code Application Notice 2-1708A.5.

- D. Special Certification requirements for Designated Seismic Systems (i.e.  $I_p = 1.5$ ): Seismic Certificates of Compliance supplied by manufacturers shall be submitted for all components that are part of Designated Seismic Systems. In accordance with the ASCE 7, certification shall be via one of the following methods:
1. For active mechanical and electrical equipment that must remain operable following the design earthquake:
    - a. Testing as detailed by part C.1.b above.
    - b. Experience data as detailed by part C.1.c above.
    - c. Equipment that is considered "rugged" per part C.2 above.
  2. Components with hazardous contents shall be certified by the manufacturer as maintaining containment following the design earthquake by:
    - a. Testing as detailed by part C.1.b above.
    - b. Experience data as detailed by part C.1.c above.
    - c. Engineering analysis utilizing dynamic characteristics and forces. Tanks (without vibration isolators) designed by a registered design professional in accordance with ASME Boiler and Pressure Vessel Code, and satisfying the force and displacement requirements of Sections 13.3.1 and 13.3.2 of ASCE 7 having an importance factor,  $I_p = 1.0$  shall be considered to satisfy the Special Seismic Certification requirements on the basis of ASCE 7 Section 13.6.9.

## PART 2 - PRODUCTS

### 2.1 VIBRATION ISOLATORS

#### A. Elastomeric Hangers **H1**:

1. Description: Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods
  - a. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
  - b. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

#### B. Spring Hangers **H2**: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.

1. Description: Combination Coil-Spring and Elastomeric-Insert Hanger with spring and Insert in Compression.
  - a. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.

- b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
  - f. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
  - g. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- C. Spring Hangers with Vertical-Limit Stop **H3**: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
- 1. Description: Combination Coil-Spring and Elastomeric-Insert Hanger with spring and insert in Compression and vertical limit stop.
    - a. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
    - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
    - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
    - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
    - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
    - f. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
    - g. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
    - h. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- D. Pipe Riser Resilient Support **R1**:
- 1. Description: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch-thick neoprene.
    - a. Vertical-Limit Stops: Steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions.
    - b. Maximum Load Per Support: 500 psig on isolation material providing equal isolation in all directions.
- E. Resilient Pipe Guides **R2**:
- 1. Description: Telescopic arrangement of two steel tubes or post and sleeve arrangement separated by a minimum 1/2-inch-thick neoprene.

- a. Factory-Set Height Guide with Shear Pin: Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.
- F. Horizontal Thrust Restraints **T1**: Modified specification S2 isolator.
1. Horizontal thrust restraints shall consist of a modified specification S2 spring mounting. Restraint springs shall have the same deflection as the isolator springs.
  2. The assembly shall be preset at the factory and fine tuned in the field to allow for a maximum of 1/4" movement from stop to maximum thrust.
  3. The assemblies shall be furnished with rod and angle brackets for attachment to both the equipment and duct work or the equipment and the structure.
  4. Restraints shall be attached at the center line of thrust and symmetrically on both sides of the unit.

## 2.2 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Amber/Booth Company, Inc.
  2. CalDyn (California Dynamics Corporation).
  3. ISAT (International Seismic Application Technology).
  4. Kinetics Noise Control.
  5. Mason Industries.
  6. Vibro-Acoustics
  7. VMC (Vibration Mountings & Controls, Inc.)
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by **an evaluation service member of ICC-ES**.
1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
  2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
  3. Maximum 1/4-inch air gap, and minimum 1/4-inch-thick resilient cushion.
- D. Channel Support System: MFMA-4, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- E. Restraint Cables: ASTM A 603 galvanized or ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for

cable engagement. Cables located in exterior or other wet locations such as wash-down areas shall be stainless steel.

- F. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod.
- G. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.
- H. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- I. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
- J. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- K. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
- L. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.
- M. All post installed anchors utilized in the seismic design must be qualified for use in cracked concrete and approved for use with seismic loads.
- N. Expansion anchors shall not be used for anchorage of equipment with motors rated over 10 HP with the exception of undercut expansion anchors. Spring or internally isolated equipment are exempt from this requirement.
- O. All beam clamps utilized for vertical support must also incorporate retention straps.
- P. All seismic brace arm anchorages to include concrete anchors, beam clamps, truss connections, etc., must be approved for use with seismic loads.

## 2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and tested equipment before shipping.
  - 1. Powder coating on springs and housings.
  - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
  - 3. Baked enamel or powder coat for metal components on isolators for interior use.

4. Color-code or otherwise mark vibration isolation and **seismic** control devices to indicate capacity range.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and **seismic** control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by **an evaluation service member of ICC-ES** and per the seismic restraint manufacturer's design.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

#### 3.3 VIBRATION-CONTROL DEVICE INSTALLATION

- A. Comply with requirements in Division 23 Section "Hydronic Piping" for piping flexible connections.
- B. Isolate all mechanical equipment 0.75 hp and over per the isolator and seismic restraint schedule and these specifications. Vibration isolators shall be selected in accordance with the equipment, pipe or duct weight distribution so as to produce reasonably uniform deflections
- C. All isolation materials and seismic restraints shall be of the same vendor and shall be selected and certified using published or factory certified data
- D. Installation of all vibration isolation materials, flexible connectors and supplemental equipment bases specified in this section shall be accomplished as per the manufacturer's written instructions with mountings adjusted to level equipment. Any variance or non-compliance with the manufacturer's instructions shall be reviewed and approved in writing by the manufacturer or corrected by the contractor in an approved manner.

- E. Installation of vibration isolators must not cause any change of position of equipment, piping or duct work resulting in stresses or misalignment.
- F. Locate isolation hangers as near to the overhead support structure as possible.
- G. No rigid connections between isolated components and the building structure shall be made that degrades the noise and vibration control system herein specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls. "Components" includes, but is not limited to, mechanical equipment, piping and ducts.
- H. Coordinate work with other trades to avoid rigid contact with the building.
- I. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.
- J. Bring to the architects/engineers attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractor's expense.
- K. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the contractor's expense.
- L. Use horizontal thrust restraints **T1** to protect Air handling equipment and centrifugal fans against excessive displacement which results from high air thrust when thrust forces exceed 10% of the equipment weight.
- M. Isolated equipment, duct and piping located on roofs must be attached to the structure. Supports (e.g., sleepers) that are not attached to the structure will not be acceptable.
- N. Where riser pipes pass through cored holes, core diameters shall be a maximum of 2" larger than pipe O.D. including insulation. Cored holes must be packed with resilient material or firestop as provided by other sections of this specification or local codes. Where seismic restraint is required specification isolator S3 shall support risers and provide longitudinal restraint at floors where thermal expansion is minimal and will not bind isolator restraints.
- O. Duct Isolation: Isolate all duct work with a static pressure 2" W.C. and over in equipment rooms and to minimum of 50 feet from the fan or air handler. Use specification type H2 or H3 hangers or type S1 or S2 floor mounts.

### 3.4 SEISMIC-RESTRAINT DEVICE INSTALLATION

#### A. Equipment Restraints:

1. On projects with Seismic Site Class A or B, seismic design or restraint is not required.

2. On projects with Seismic Design Category C: Components with an importance factor of 1.0 do not require seismic design or restraint.
3. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
4. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
5. Install seismic-restraint devices using methods approved by **an evaluation service member of ICC-ES** providing required submittals for component.
6. Suspended Equipment: All suspended equipment that meets any of the following conditions requires seismic restraints as specified by the supplier:
  - a. Rigidly attached to pipe or duct that is 75 lbs. and greater,
  - b. Items greater than 20 lbs and distribution systems weighing more than 5 lbs/lineal foot, with an importance factor of 1.0 hung independently or with flexible connections.
  - c. Possibility of consequential damage.
  - d. For importance factors greater than 1.0 all suspended equipment requires seismic restraint regardless of the above notes.
  - e. Wall mounted equipment weighing more than 20 lbs.
  - f. Exemptions:
    - 1) Equipment weighing less than 20 lbs and distribution systems weighing less than 5 lbs/lineal foot, with an  $I_p = 1.0$  and where flexible connections exist between the component and associated ductwork, piping or conduit.
- B. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
- C. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
- D. Install seismic-restraint devices using methods approved by **an evaluation service member of ICC-ES** providing required submittals for component.
- E. Installation and adjustment of all seismic restraints specified in this section shall be accomplished as per the manufacturer's written instructions. Any deviation from the manufacturer's instructions shall be reviewed and approved by the manufacturer.
- F. Piping Restraints:
  1. Comply with requirements in MSS SP-127.
  4. Seismically restrain piping, with an  $I_p = 1.0$ , located in boiler rooms, mechanical equipment rooms and refrigeration equipment rooms that is 1¼" I.D. and larger.
  5. Seismically restrain all other  $I_p = 1.0$  piping 2½" diameter and larger.
  6. Seismically restrain all  $I_p = 1.5$  piping larger than 1" diameter.
  7. Branch lines may not be used to brace main lines.



8. Exemptions:
- a. All high deformability pipe 3" or less in diameter suspended by individual hanger rods where  $l_p = 1.0$ .
  - b. High deformability pipe or conduit in Seismic Design Category C, 2" or less in diameter suspended by individual hanger rods where  $l_p = 1.5$ .
  - c. High deformability pipe in Seismic Design Category D, E or F, 1" or less in diameter suspended by individual hanger rods where  $l_p = 1.5$ .
  - d. All clevis supported pipe runs installed less than 12" from the top of the pipe to the underside of the support point and trapeze supported pipe suspended by hanger rods having a distance less than 12" in length from the underside of the pipe support to the support point of the structure.
  - e. Piping systems, including their supports, designed and constructed in accordance with ASME B31.
  - f. Piping systems, including their supports, designed and constructed in accordance with NFPA, provided they meet the force and displacement requirements of Section 13.3.1 and 13.3.2 (ASCE 7).
- G. Install flexible metal hose loops in piping which crosses building seismic joints, sized for the anticipated amount of movement.
- H. Install flexible piping connectors where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment.
- I. Where pipe sizes reduce below dimensions required for seismic, the final restraint shall be installed at the transition location.
- J. Restraint Spacing For Piping: Sizes shown are maximum. Actual spacing determined by calculation.
1. For non-ductile piping (e.g., cast iron, PVC) space transverse supports a maximum of 20' o.c., and longitudinal supports a maximum of 40' o.c.
  2. For piping with hazardous material inside (e.g., natural gas, medical gas) space Transverse supports a maximum of 20' o.c., and longitudinal supports a maximum of 40' o.c.
  3. For pipe risers, restrain the piping at floor penetrations using the same spacing requirements as above.
  4. For all other ductile piping see Table "A" below
- K. Seismic Restraint of Ductwork: Seismically restrain per specific code requirements, all ductwork listed below (unless otherwise indicated on the drawings), using seismic cable restraints: (Ductwork not meeting criteria listed below is to be "Exempt")
1. Restrain rectangular ductwork with cross sectional area of 6 square feet or larger. Duct with and an importance factor of 1.5 must be braced with no exceptions regardless of size or distance requirements.
  2. Restrain flat oval ducts the same as rectangular ducts of the same nominal size.
  3. Duct must be reinforced at the restraint locations. Reinforcement shall consist of an additional angle on top of the ductwork that is attached to the support hanger rods. Ductwork is to be attached to both upper angle and lower trapeze.

Additional reinforcing is not required if duct sections are mechanically fastened together with frame bolts and positively fastened to the duct support suspension system.

4. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.
  5. Walls, including gypsum board non-bearing partitions, which have ducts running through them, may replace a typical transverse brace. Provide channel framing around ducts and solid blocking between the duct and frame.
  6. If ducts are supported by angles, channels or struts, ducts shall be fastened to it at seismic brace locations in lieu of duct reinforcement.
  7. All ductwork weighing more than 17 lb/ft.
  8. Exemptions:
    - a. Duct runs supported at locations by two rods less than 12 inches in length from the structural support to the structural connection to the ductwork. This exemption does not apply to ducts with an importance factor of 1.5.
  9. See Table "A" below for restraint spacing.
- L. Exemptions do not apply for:
1. Life Safety or High Hazard Components
    - a. Including gas, fire protection, medical gas, fuel oil and compressed air needed for the continued operation of the facility or whose failure could impair the facility's continued operation, Occupancy Category IV, IBC-2009 as listed in Section 1.3 B regardless of governing code for HVAC, Plumbing, Electrical piping or equipment. (A partial list is illustrated.) High Hazard is additionally classified as any system handling flammable, combustible or toxic material. Typical systems not excluded are additionally listed below.
  2. Piping
    - a. Fuel oil, gasoline, natural gas, medical gas, steam, compressed air or any piping containing hazardous, flammable, combustible, toxic or corrosive materials. Fire protection standpipe, risers and mains. Fire Sprinkler Branch Lines must be end tied.
  3. Duct
    - a. Smoke evacuation duct or fresh air make up connected to emergency system, emergency generator exhaust, boiler breeching or as used by the fire department on manual override.
  4. Equipment
    - a. Previously excluded non life safety duct mounted systems such as fans, variable air volume boxes, heat exchangers and humidifiers having a weight greater than 75 lbs require independent seismic bracing.
- M. Spacing Chart For Suspended Components:

<b>Table "A" Seismic Bracing (Maximum Allowable Spacing Shown- Actual Spacing to Be Determined by Calculation)</b>			
<b>Equipment</b>	<b>On Center Transverse</b>	<b>On Center Longitudinal</b>	<b>Change Of Direction</b>
<b>Duct</b>			
All Sizes	30 Feet	60 Feet	4 Feet
<b>Pipe Threaded, Welded, Soldered Or Grooved</b>			
To 16"	40 Feet	80 Feet	4 Feet
18" – 28"	30 Feet	60 Feet	4 Feet
30" – 40"	20 Feet	60 Feet	4 Feet
42" & Larger	10 Feet	30 Feet	4 Feet

- N. Roof mounted duct is to be installed on sleepers or frames mechanically connected to the building structure. Roof anchors and seismic cables or frames shall be used to resist seismic and wind loading. Wind loading factors shall be determined by the registered design professional.
- O. Where duct sizes reduce below dimensions required for seismic restraint the final restraint shall be installed at the transition location.
- P. Install cables so they do not bend across edges of adjacent equipment or building structure.
- Q. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- R. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- S. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- T. Seismically Rated Beam Clamps are required where welding to or penetrations to steel beams are not approved.

3.5 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 23 Section "Hydronic Piping" for piping flexible connections.

## 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
  - 1. A representative of the vibration isolation system manufacturer shall review the project installation and provide documentation indicating conformance to vibration isolation design intent
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Prepare test and inspection reports.
  - 1. The installing contractor shall submit a report upon request to the building architect and/or engineer, including the manufacturer's representative's final report, indicating that all seismic restraint material has been properly installed, or steps that are to be taken by the contractor to properly complete the seismic restraint work as per the specifications.

## 3.7 ADJUSTING

- A. Adjust isolators after piping system is at operating weight.
- B. Adjust leveling devices as required to distribute loading uniformly on isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.
  - 1. Adjust active height of spring isolators.
- C. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION

**SECTION 230550 - OPERATION AND MAINTENANCE OF HVAC SYSTEMS**

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. All pertinent sections of Division 21, 22, & 23 Mechanical General Requirements, are part of the work of this Section. Division 1 is part of this and all other sections of these specifications.
  - 1. Testing and Balancing is specified in section 230594.
  - 2. Training and Instructions to Owner's Representative is specified in section 230100.

## 1.2 SCOPE OF WORK

- A. Submission of Operating and Maintenance Manuals complete with Balancing reports. (Coordinate with Division 1).
- B. Coordination of work required for system commissioning.
- C. **Provide a hard copy and an electronic copy on CD of the O and M manual fully searchable in PDF format.**

## 1.3 SUBMITTALS

- A. Submit product data in accordance with Division 1 and Section 230100. Submit the following:
  - 1. Sample of O and M manual outline.
  - 2. Hard copy and an electronic copy on CD of the O and M manual fully searchable in PDF format. Both the hard copy and the electronic copy are to be fully indexed. The electronic copy shall also have a linked index.

## PART 2 - PRODUCTS

## 2.1 O &amp; M MANUALS

- A. The operating and maintenance manuals shall be as follows:
  - 1. Binders shall be red buckram with easy-view metal for size 8-1/2 x 11-inch sheets, with capacity expandable from 2 inches to 3-1/2 inches as required for the project. Construction shall be rivet-through with library corners. No. 12 backbone and lining shall be the same material as the cover. The front cover and backbone shall be foil-stamped in white as follows: (coordinate with **Division 01** )

## OPERATING AND MAINTENANCE

MANUAL  
FOR THE

(INSERT PROJECT NAME)

(INSERT PROJECT COMPLETION YEAR)

VOLUME No. ( )

VAN BOERUM & FRANK ASSOCIATES, INC.  
MECHANICAL ENGINEER

(INSERT ARCHITECT)

PART 3 - EXECUTION

3.1 OPERATING AND MAINTENANCE MANUALS:

- A. Work under this section shall be performed in concert with the contractor performing the system testing and balancing. Six (6) copies of the manuals shall be furnished to the Architect for distribution to the owner.
- B. The "Start-Up and Operation" section is one of the most important in the manual. Information in this section shall be complete and accurately written and shall be verified with the actual equipment on the job, such as switches, starters, relays, automatic controls, etc. A step-by-step start-up procedure shall be described.
- C. The manuals shall include air and water-balancing reports, system commissioning procedures, start-up tests and reports, equipment and system performance test reports, warranties, and certificates of training given to the owner's representatives.

An index sheet typed on AICO Gold-Line indexes shall be provided in the front of the binder. The manual shall include the following:

SYSTEM DESCRIPTIONS

START-UP PROCEDURE AND OPERATION OF SYSTEM

MAINTENANCE AND LUBRICATION TABLE

OPERATION AND MAINTENANCE BULLETINS

AUTOMATIC TEMPERATURE CONTROL DESCRIPTION OF OPERATION, INTERLOCK AND CONTROL DIAGRAMS, AND CONTROL PANELS.

AIR AND WATER SYSTEM BALANCING REPORTS

EQUIPMENT WARRANTIES AND TRAINING CERTIFICATES

SYSTEM COMMISSIONING REPORTS

EQUIPMENT START-UP CERTIFICATES

END OF SECTION

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**SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

## 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. Equipment labels.
  - 2. Duct labels.
  - 3. Stencils.
  - 4. Specialty Gas.
  - 5. Ceiling grid.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system to include in maintenance manuals.

## 1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

## 2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:

1. Material and Minimum Thickness, predrilled or stamped holes for attachment hardware:
    - a. **Brass, 0.032-inch .**
  2. Minimum Label Size: Length and width vary for required label content, but not less than **2-1/2** by **3/4 inch**.
  3. Minimum Letter Size: **1/4 inch** for name of units if viewing distance is less than **24 inches**, **1/2 inch** for viewing distances up to **72 inches**, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  4. Fasteners: Stainless-steel;
    - a. **Rivets or self-tapping screws**
  5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, and having predrilled holes for attachment hardware, **1/16 inch** thick.
  2. Letter Color:
    - a. **Black.**
  3. Background Color:
    - a. **White.**
  4. Maximum Temperature: Able to withstand temperatures up to **160 deg F**.
  5. Minimum Label Size: Length and width vary for required label content, but not less than **2-1/2** by **3/4 inch**.
  6. Minimum Letter Size: **1/4 inch** for name of units if viewing distance is less than **24 inches**, **1/2 inch** for viewing distances up to **72 inches**, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  7. Fasteners: Stainless-steel;
    - a. **Rivets or self-tapping screws**
  8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.
- ## 2.2 DUCT LABELS
- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, having predrilled holes for attachment hardware; **1/16 inch** thick.

- B. Letter Color:
  - 1. **White.**
- C. Background Color:
  - 1. **Black.**
- D. Maximum Temperature: Able to withstand temperatures up to **160 deg F.**
- E. Minimum Label Size: Length and width vary for required label content, but not less than **2-1/2 by 3/4 inch.**
- F. Minimum Letter Size: **1/4 inch** for name of units if viewing distance is less than **24 inches**, **1/2 inch** for viewing distances up to **72 inches**, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel;
  - 1. Rivets or self-tapping screws
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
  - 2. Lettering Size: At least **1-1/2 inches** high.

### 2.3 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of **1-1/4 inches** for ducts; and minimum letter height of **3/4 inch** for access panel and door labels, equipment labels, and similar operational instructions.
  - 1. Stencil Material:
    - a. **Aluminum .**
  - 2. Stencil Paint:
    - a. Exterior, gloss, **alkyd enamel** black unless otherwise indicated.
    - b. Paint may be in pressurized spray-can form.
  - 3. Identification Paint:
    - a. Exterior, **alkyd enamel** in colors according to ASME A13.1 unless otherwise indicated.

### 2.4 SPECIALTY GAS

- A. All piping for specialty gases shall be identified and marked consistent with the discipling and industry governing the same and ANSI standards.

## 2.5 CEILING GRID

- A. Provide red lettering on the ceiling tile grid of the locations of all fire dampers, smoke dampers and fire/smoke dampers. Size of lettering and verbiage is to conform to IBC and NFPA standards.
- B. Provide valve identification for all HVAC valves located above the ceiling on the ceiling grid below the valve.
- C. Provide VAV box identification for all VAV boxes located above the ceiling on the ceiling grid below the VAV box.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

### 3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

### 3.3 DUCT LABEL INSTALLATION

- A. Install **plastic-laminated** duct labels with permanent adhesive on air ducts in the following color codes:
  - 1. **Blue** : For cold-air supply ducts.
  - 2. **Yellow** : For hot-air supply ducts.
  - 3. **Green** : For exhaust-, outside-, relief-, return-, and mixed-air ducts.
  - 4. ASME A13.1 Colors and Designs: For hazardous material exhaust.
- B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of **50 feet** in each space where ducts are exposed or concealed by removable ceiling system.

### 3.4 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

**SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC**

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. Balancing Air Systems:
    - a. Constant-volume air systems.
    - b. Variable-air-volume systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within the following number of days of the Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article;
  - 1. **30 days.**
- B. Certified TAB reports.
- C. Instrument calibration reports, to include the following:
  - 1. Instrument type and make.
  - 2. Serial number.
  - 3. Application.
  - 4. Dates of use.
  - 5. Dates of calibration.

## 1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by **AABC** or **NEBB**.
  - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by **AABC** or **NEBB** and shall be the same as the TAB Contractor.
  - 2. TAB Technician: Employee of the TAB contractor and who is certified by **AABC** or **NEBB** as a TAB technician and shall be the same as the TAB Contractor.
- B. Certify TAB field data reports and perform the following:
  - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
  - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard TAB contractor's forms approved by:
  - 1. **Architect**.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

## 1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

## 1.7 COORDINATION

- A. Notice: Provide **seven** days' advance notice for each test. Include scheduled test dates and times.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

## 3.1 TAB SPECIALISTS

- A. Subject to compliance with requirements, **engage one of the following**:
  - 1. Bonneville Test and Balance
  - 2. BTC Service.
  - 3. Certified Test & Balance.
  - 4. Diamond Test & Balance.
  - 5. RS Analysis.
  - 6. Test & Balance Inc.
  - 7. Payson Sheetmetal.

8. QT&B Inc.
9. Independent Test & Balance.
10. Intermountain Test & Balance.
11. Tempco.
12. Mechanical Testing Corporation.

### 3.2 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine:
  1. Ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in:
    - a. **Section 233113 Metal Ducts**
  2. Verify ceiling plenums and underfloor air plenums used for supply, return or relief air are properly separated from adjacent areas.
  3. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
  4. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- K. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

- L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- M. Examine system pumps to ensure absence of entrained air in the suction piping.
- N. Examine operating safety interlocks and controls on HVAC equipment.
- O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

### 3.3 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
  - 1. Permanent electrical-power wiring is complete.
  - 2. Hydronic systems are filled, clean, and free of air.
  - 3. Automatic temperature-control systems are operational.
  - 4. Equipment and duct access doors are securely closed.
  - 5. Balance, smoke, and fire dampers are open.
  - 6. Isolating and balancing valves are open and control valves are operational.
  - 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
  - 8. Windows and doors can be closed so indicated conditions for system operations can be met.

### 3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in this section and:
  - 1. **AABC's "National Standards for Total System Balance"**
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
  - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
  - 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in **inch-pound (IP)** .



## 3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Section 2331 13 "Metal Ducts."

## 3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
  - 1. Measure total airflow.
    - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
  - 2. Measure fan static pressures as follows to determine actual static pressure:
    - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
    - b. Measure static pressure directly at the fan outlet or through the flexible connection.
    - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
    - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
    - a. Report the cleanliness status of filters and the time static pressures are measured.
  4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
  5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
  6. Obtain approval from one of the following entities for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance:
    - a. **Architect .**
  7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure airflow of submain and branch ducts.
    - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
  2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
  3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
  2. Adjust patterns of adjustable outlets for proper distribution without drafts.

## 3.7 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
- B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
  2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
  3. Measure total system airflow. Adjust to within indicated airflow.
  4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
  5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
    - a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.
  6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
  7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
  8. Record final fan-performance data.
- C. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
1. Balance variable-air-volume systems the same as described for constant-volume air systems.
  2. Set terminal units and supply fan at full-airflow condition.
  3. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
  4. Readjust fan airflow for final maximum readings.
  5. Measure operating static pressure at the sensor that controls the supply fan if one is installed, and verify operation of the static-pressure controller.

6. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
    - a. If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.
  7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
- D. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
1. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
  2. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.
  3. Set terminal units at full-airflow condition.
  4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
  5. Adjust terminal units for minimum airflow.
  6. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

### 3.8 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
1. Supply, Return, and Exhaust Fans and Equipment with Fans: **Plus or minus 10 percent** .
  2. Air Outlets and Inlets: **Plus or minus 10 percent** .

### 3.9 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare progress reports on the following interval to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors;

**1. Weekly.**

## 3.10 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
  2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Pump curves.
  2. Fan curves.
  3. Manufacturers' test data.
  4. Field test reports prepared by system and equipment installers.
  5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
  2. Name and address of the TAB contractor.
  3. Project name.
  4. Project location.
  5. Architect's name and address.
  6. Engineer's name and address.
  7. Contractor's name and address.
  8. Report date.
  9. Signature of TAB supervisor who certifies the report.
  10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
  11. Summary of contents including the following:
    - a. Indicated versus final performance.
    - b. Notable characteristics of systems.
    - c. Description of system operation sequence if it varies from the Contract Documents.
  12. Nomenclature sheets for each item of equipment.
  13. Data for terminal units, including manufacturer's name, type, size, and fittings.
  14. Notes to explain why certain final data in the body of reports vary from indicated values.
  15. Test conditions for fans and pump performance forms including the following:
    - a. Settings for outdoor-, return-, and exhaust-air dampers.
    - b. Conditions of filters.
    - c. Cooling coil, wet- and dry-bulb conditions.
    - d. Face and bypass damper settings at coils.
    - e. Fan drive settings including settings and percentage of maximum pitch diameter.

- f. Inlet vane settings for variable-air-volume systems.
  - g. Settings for supply-air, static-pressure controller.
  - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
  2. Water and steam flow rates.
  3. Duct, outlet, and inlet sizes.
  4. Pipe and valve sizes and locations.
  5. Terminal units.
  6. Balancing stations.
  7. Position of balancing devices.
- E. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:
    - a. System and air-handling-unit number.
    - b. Location and zone.
    - c. Traverse air temperature in deg F.
    - d. Duct static pressure in inches wg.
    - e. Duct size in inches.
    - f. Duct area in sq. ft..
    - g. Indicated air flow rate in cfm.
    - h. Indicated velocity in fpm.
    - i. Actual air flow rate in cfm.
    - j. Actual average velocity in fpm.
    - k. Barometric pressure in psig.
- F. Air-Terminal-Device Reports:
1. Unit Data:
    - a. System and air-handling unit identification.
    - b. Location and zone.
    - c. Apparatus used for test.
    - d. Area served.
    - e. Make.
    - f. Number from system diagram.
    - g. Type and model number.
    - h. Size.
    - i. Effective area in sq. ft..
  2. Test Data (Indicated and Actual Values):
    - a. Air flow rate in cfm.
    - b. Air velocity in fpm.
    - c. Preliminary air flow rate as needed in cfm.
    - d. Preliminary velocity as needed in fpm.
    - e. Final air flow rate in cfm.

- f. Final velocity in fpm.
- g. Space temperature in deg F.

G. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

### 3.11 INSPECTIONS

A. Initial Inspection:

- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
- 2. Check the following for each system:
  - a. Measure airflow of at least **10** percent of air outlets.
  - b. Measure water flow of at least **5** percent of terminals.
  - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
  - d. Verify that balancing devices are marked with final balance position.
  - e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

- 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by:
  - a. **Architect**.
- 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of:
  - a. Architect.
- 3. The following entity shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day:
  - a. **Architect**.
- 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
  2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

END OF SECTION



**SECTION 230713 - DUCT INSULATION**

## 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 insulating the following duct services:
  - 1. Indoor, concealed supply and return.
- B. Related Sections:
  - 1. Section 230716 "HVAC Equipment Insulation."
  - 2. Section 233113 "Metal Ducts" for duct liners.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  - 2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
  - 3. Detail application of field-applied jackets.
  - 4. Detail application at linkages of control devices.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  - 1. Insulation Installed Indoors: Flame-spread index of **25** or less, and smoke-developed index of 50 or less.
  - 2. Insulation Installed Outdoors: Flame-spread index of **75** or less, and smoke-developed index of 150 or less.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

## 1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

## 1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## PART 2 - PRODUCTS

## 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Aeroflex USA, Inc.; Aerocel.
    - b. Armacell LLC; AP Armaflex.
    - c. K-Flex USA; Insul-Sheet, K-Flex Gray Duct Liner, and K-FLEX LS.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, **Type III with factory-applied FSK jacket**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; SoftTouch Duct Wrap.
    - b. Johns Manville; Microlite.
    - c. Knauf Insulation; Friendly Feel Duct Wrap.
    - d. Manson Insulation Inc.; Alley Wrap.
    - e. Owens Corning; SOFTR All-Service Duct Wrap.
- H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation **with factory-applied ASJ**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; Commercial Board.
    - b. Fibrex Insulations Inc.; FBX.
    - c. Johns Manville; 800 Series Spin-Glas.

- d. Knauf Insulation; Insulation Board.
- e. Manson Insulation Inc.; AK Board.
- f. Owens Corning; Fiberglas 700 Series.

## 2.2 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to **1700 deg F**. Comply with ASTM C 656, Type II, Grade 6. Tested and certified to provide a:
  - a. 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction
- 1. Products: Subject to compliance with requirements, provide the following :
  - a. Johns Manville; Super Firetemp M.
- B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a:
  - a. **2**-hour fire rating by an NRTL acceptable to authorities
- 2. Products: Subject to compliance with requirements, provide one of the following :
  - a. CertainTeed Corp.; FlameChek.
  - b. Johns Manville; Firetemp Wrap.
  - c. Nelson Fire Stop Products; Nelson FSB Flameshield Blanket.
  - d. Thermal Ceramics; FireMaster Duct Wrap.
  - e. 3M; Fire Barrier Wrap Products.
  - f. Unifrax Corporation; FyreWrap.

## 2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Aeroflex USA, Inc.; Aeroseal.
    - b. Armacell LLC; Armaflex 520 Adhesive.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
    - d. K-Flex USA; R-373 Contact Adhesive.
  - 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
  - 1. Products: Subject to compliance with requirements, provide one of the following:

- a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
  - b. Eagle Bridges - Marathon Industries; 225.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
  - d. Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. FSK Jacket Adhesive, and ASJ Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements, **provide one of the following:**
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
    - b. Eagle Bridges - Marathon Industries; 225.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
    - d. Mon-Eco Industries, Inc.; 22-25.
  2. For indoor applications, adhesive shall have a VOC content of **50** g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2.4 MASTICS
- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
    - b. Vimasco Corporation; 749.
  2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, **0.013 perm** at **43-mil** dry film thickness.
  3. Service Temperature Range: **Minus 20 to plus 180 deg F.**
  4. Solids Content: ASTM D 1644, **58 percent** by volume and **70 percent** by weight.
  5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
1. Products: Subject to compliance with requirements, provide one of the following:

- a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
  - b. Eagle Bridges - Marathon Industries; 550.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
  - d. Mon-Eco Industries, Inc.; 55-50.
  - e. Vimasco Corporation; WC-1/WC-5.
2. Water-Vapor Permeance: ASTM F 1249, **1.8 perms** at **0.0625-inch** dry film thickness.
  3. Service Temperature Range: **Minus 20 to plus 180 deg F.**
  4. Solids Content: **60 percent** by volume and **66 percent** by weight.
  5. Color: White.

## 2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
1. For indoor applications, use lagging adhesives that have a VOC content of **50 g/L** or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
    - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    - c. Vimasco Corporation; 713 and 714.
  3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
  4. Service Temperature Range: **0 to plus 180 deg F.**
  5. Color: White.

## 2.6 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    - b. Eagle Bridges - Marathon Industries; 405.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    - d. Mon-Eco Industries, Inc.; 44-05.
  2. Materials shall be compatible with insulation materials, jackets, and substrates.
  3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: **Minus 40 to plus 250 deg F.**
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of **420 g/L** or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
  1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

## 2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. Metal Jacket:
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
    - b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
    - c. RPR Products, Inc.; Insul-Mate.
  2. Aluminum Jacket: Comply with **ASTM B 209**, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
    - a. **Sheet and roll stock ready for shop or field sizing**
    - b. Finish and thickness are indicated in field-applied jacket schedules.
    - c. Moisture Barrier for Indoor Applications: **3-mil-thick, heat-bonded polyethylene and kraft paper.**
    - d. Moisture Barrier for Outdoor Applications: **3-mil-thick, heat-bonded polyethylene and kraft.**

## 2.9 TAPES

- A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ABI, Ideal Tape Division; 491 AWF FSK.
    - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
    - c. Compac Corporation; 110 and 111.
    - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: **3 inches**.
3. Thickness: **6.5 mils**.
4. Adhesion: **90 ounces force/inch** in width.
5. Elongation: **2** percent.
6. Tensile Strength: **40 lbf/inch** in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. ABI, Ideal Tape Division; 488 AWF.
  - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
  - c. Compac Corporation; 120.
  - d. Venture Tape; 3520 CW.
2. Width: **2 inches**.
3. Thickness: **3.7 mils**.
4. Adhesion: **100 ounces force/inch** in width.
5. Elongation: **5** percent.
6. Tensile Strength: **34 lbf/inch** in width.

## 2.10 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. ITW Insulation Systems; Gerrard Strapping and Seals.
  - b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
2. Aluminum: **ASTM B 209**, Alloy 3003, 3005, 3105, or 5005; Temper H-14, **0.020 inch** thick, **3/4 inch** wide with **wing seal**.
3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, **0.135-inch**-diameter shank, length to suit depth of insulation indicated.
  - a. Products: Subject to compliance with requirements, provide one of the following:
    - 1) AGM Industries, Inc.; CWP-1.
    - 2) GEMCO; CD.
    - 3) Midwest Fasteners, Inc.; CD.
    - 4) Nelson Stud Welding; TPA, TPC, and TPS.
2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, **0.135-inch**- diameter shank,



length to suit depth of insulation indicated with integral **1-1/2-inch** galvanized carbon-steel washer.

- a. Products: Subject to compliance with requirements, provide one of the following:
  - 1) AGM Industries, Inc.; CHP-1.
  - 2) GEMCO; Cupped Head Weld Pin.
  - 3) Midwest Fasteners, Inc.; Cupped Head.
  - 4) Nelson Stud Welding; CHP.
3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a. Products: Subject to compliance with requirements, provide one of the following:
    - 1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
    - 2) GEMCO; Perforated Base.
    - 3) Midwest Fasteners, Inc.; Spindle.
  - b. Baseplate: Perforated, galvanized carbon-steel sheet, **0.030 inch** thick by **2 inches** square.
  - c. Spindle: **Copper- or zinc-coated, low-carbon steel** fully annealed, **0.106-inch-** diameter shank, length to suit depth of insulation indicated.
  - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
  - a. Products: Subject to compliance with requirements, provide one of the following:
    - 1) GEMCO; Nylon Hangers.
    - 2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.
  - b. Baseplate: Perforated, nylon sheet, **0.030 inch** thick by **1-1/2 inches** in diameter.
  - c. Spindle: Nylon, **0.106-inch-** diameter shank, length to suit depth of insulation indicated, up to **2-1/2 inches**.
  - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position

indicated when self-locking washer is in place. Comply with the following requirements:

- a. Products: Subject to compliance with requirements, provide one of the following:
  - 1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
  - 2) GEMCO; Peel & Press.
  - 3) Midwest Fasteners, Inc.; Self Stick.
- b. Baseplate: Galvanized carbon-steel sheet, **0.030 inch** thick by **2 inches** square.
- c. Spindle: **Copper- or zinc-coated, low-carbon steel**, fully annealed, **0.106-inch-** diameter shank, length to suit depth of insulation indicated.
- d. Adhesive-backed base with a peel-off protective cover.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
  1. Verify that systems to be insulated have been tested and are free of defects.
  2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

#### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.

- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with **3-inch-** wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced **4 inches** o.c.
  - 3. Overlap jacket longitudinal seams at least **1-1/2 inches**. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at:
    - a. **2 inche** o.c.
    - b. For below ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least **4 inches** beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

### 3.4 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least **2 inches**.
  - 1. Comply with requirements in Section 078413 "Penetration Firestopping" firestopping and fire-resistive joint sealers.

### 3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

### 3.6 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
  - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for:
    - a. **100** percent coverage of duct and plenum surfaces.
  - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  - 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions **18 inches** and smaller, place pins along longitudinal centerline of duct. Space **3 inches** maximum from insulation end joints, and **16 inches** o.c.
    - b. On duct sides with dimensions larger than **18 inches**, place pins **16 inches** o.c. each way, and **3 inches** maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not overcompress insulation during installation.
    - e. Impale insulation over pins and attach speed washers.
    - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
  - 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing **2 inches** from one edge and one end of insulation segment. Secure laps to adjacent insulation section with **1/2-inch** outward-clinching staples, **1 inch** o.c. Install vapor barrier consisting of factory- or

field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
  - b. Install vapor stops for ductwork and plenums operating below **50 deg F** at **18-foot** intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than **3 inches**.
5. Overlap unfaced blankets a minimum of **2 inches** on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of **18 inches** o.c.
  6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
  7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with **6-inch-** wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced **6 inches** o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for:
    - a. 50 percent coverage of duct and plenum surfaces.
  2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions **18 inches** and smaller, place pins along longitudinal centerline of duct. Space **3 inches** maximum from insulation end joints, and **16 inches** o.c.
    - b. On duct sides with dimensions larger than **18 inches**, space pins **16 inches** o.c. each way, and **3 inches** maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not overcompress insulation during installation.
    - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
  4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing **2 inches** from one edge and one end of insulation segment. Secure laps to adjacent insulation section with **1/2-inch** outward-clinching staples, **1 inch** o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with **6-inch-** wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced **6 inches** o.c.

### 3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
  1. Draw jacket smooth and tight to surface with **2-inch** overlap at seams and joints.
  2. Embed glass cloth between two **0.062-inch-** thick coats of lagging adhesive.
  3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- B. Where FSK jackets are indicated, install as follows:
  1. Draw jacket material smooth and tight.
  2. Install lap or joint strips with same material as jacket.
  3. Secure jacket to insulation with manufacturer's recommended adhesive.
  4. Install jacket with **1-1/2-inch** laps at longitudinal seams and **3-inch-** wide joint strips at end joints.
  5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- C. Where PVC jackets are indicated, install with **1-inch** overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturers recommended adhesive.
  1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- D. Where metal jackets are indicated, install with **2-inch** overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands **12 inches** o.c. and at end joints.

### 3.8 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

## 3.9 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
  - 1. Flat Acrylic Finish: **Two** finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

## 3.10 FIELD QUALITY CONTROL

- A. Testing Agency:
  - a. Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to **one** location for each duct system defined in the "Duct Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

## 3.11 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
  - 1. Indoor, concealed supply and outdoor air.
  - 2. Indoor, concealed return located in unconditioned space.
- B. Items Not Insulated:
  - 1. Fibrous-glass ducts.
  - 2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
  - 3. Factory-insulated flexible ducts.
  - 4. Factory-insulated plenums and casings.

5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.12 Insulation shall have an R value that meets the minimum requirements of the latest International Energy Conservation Code (IECC).

3.13 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. All supply and return ducts and plenums shall be insulated with not less than R-6 insulation.
- B. Concealed, round and flat-oval, supply-air duct insulation shall be **one of** the following:
  1. Flexible Elastomeric: **1-1/2 inch** thick.
  2. Mineral-Fiber Blanket: **2 inches** thick and **0.75-lb/cu. ft.** nominal density.
- C. Concealed, round, return-air duct insulation shall be **one of** the following:
  1. Flexible Elastomeric: **1-1/2 inch** thick.
  2. Mineral-Fiber Blanket: **2 inches** thick and **0.75-lb/cu. ft.** nominal density.
- D. Concealed, rectangular, supply-air duct insulation shall be **one of** the following:
  1. Flexible Elastomeric: **1-1/2 inch** thick.
  2. Mineral-Fiber Blanket: **2 inches** thick and **0.75-lb/cu. ft.** nominal density.
- E. Concealed, rectangular, return-air duct insulation shall be **one of** the following:
  1. Flexible Elastomeric: **1-1/2 inch** thick.
  2. Mineral-Fiber Blanket: **2 inches** thick and **0.75-lb/cu. ft.** nominal density.

END OF SECTION



**SECTION 230900 – BUILDING AUTOMATION SYSTEM**

## PART 1 - GENERAL

## 1.1 SCOPE OF WORK

- A. The Facility Management and Control System (FMCS) Contractor shall furnish and install a fully integrated building automation system, incorporating direct digital control (DDC) for energy management, equipment monitoring and control as herein specified. The system shall include all required computer software and licenses, hardware, controllers, sensors, transmission equipment, system workstations, local panels, conduit, wire, installation, engineering, database and setup, supervision, commissioning, acceptance test, training, warranty service and, at the owner's option, extended warranty service. Licenses for all software shall be registered to Intermountain Health Care. Include all upgrades for a period of two years.
- B. The system shall only employ BACnet communications in an open architecture with the capabilities to support a multi-vendor environment. The system shall be capable of integrating third party systems and utilizing the following standard protocols.
  - 1. BACnet communication according to ASHRAE standard ANSI/ASHRAE 135-2004.
- C. The FMCS shall utilize a JCI user interface and shall provide total integration with the existing JCI Metasys infrastructure with user access to all system data either locally over a secure Intranet within the building or by remote access by a standard Web Browser over the Internet.
- D. The FMCS shall demonstrate, with (3) proof sources, integration with HVAC industry open standard protocols, including BACnet and Internet standard SQL database and HTTP / HTML / XML text formats.
- E. All materials and equipment used shall be standard components, regularly manufactured with standard part numbers and owners manuals for this and/or other systems. One of a kind, third party or custom integrations devices designed specially for this project will not be allowed.
- F. Contractor shall provide physical label on thermostat to indicate equipment to be controlled.**
- G. Contractor shall update BAS graphic page for new remodel floor plan.**

## 1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Drawings and general provisions of the Contract, including General and supplementary Conditions and Division-1 specification sections, apply to work of this section.
- B. Products furnished but not installed under this section:

1. Valves, flow switches, flow sensors, thermowells and pressure taps to be installed under division 23.
  2. Automatic dampers to be installed under division 23.
- C. Coordination with electrical:
1. Installation of all line voltage power wiring by division 26.
  2. Each motor starter provided under Division 26, shall be furnished with individual control power transformer to supply 120 volt control power and auxiliary contacts (one N.O. and one N.C.) for use by this section.

### 1.3 QUALITY ASSURANCE

- A. The system shall be furnished, engineered, and installed by the manufacturers' locally authorized representative. The controls contractor shall have factory-trained technicians to provide instruction, routine maintenance, and emergency service within 24 hours upon receipt of request.
- B. At the time of bid, all FMCS Application Specific Controllers and Programmable Equipment Controllers shall be listed as follows:
1. Underwriters Laboratory, UL 916
  2. FCC Regulation, Part 15, Class B

### 1.4 SUBMITTALS

- A. Submit 6 complete sets of documentation in the following phased delivery schedule:
1. Valve and damper schedules
  2. Equipment data cut sheets
  3. System schematics, including:
    - a. sequence of operations
    - b. point names
    - c. point addresses
    - d. point to point wiring (**identify both BacNET and hardwired points**)
    - e. interface wiring diagrams
    - f. panel layouts
    - g. system riser diagrams
    - h. **Obtain device ID and trunk ID's from Intermountain before adding engine to IH network**
  4. AutoCAD® compatible as-built drawings.
  5. **Control contractor to resubmit a narrative response to all review comments provided by engineering team and owner during initial submittal review phase.**
- B. Upon project completion, submit operation and maintenance manuals, consisting of the following:
1. Index sheet, listing contents in alphabetical order

2. Manufacturer's equipment parts list of all functional components of the system, disk of system schematics, including wiring diagrams
3. Description of sequence of operations
4. As-Built interconnection wiring diagrams
5. User's documentation containing product, system architectural and programming information.
6. Trunk cable schematic showing remote electronic panel locations, and all trunk data
7. List of connected data points, including panels to which they are connected and input device (ionization detector, sensors, etc.)
- 8. Identify control points trending and alarms per IH recommended list.**
9. Conduit routing diagrams
10. Copy of the warranty/guarantee
11. Operating and maintenance cautions and instructions
12. Recommended spare parts list
- 13. Device locations and labeling of each point on the controller.**

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Johnson Controls, Metasys Extended Architecture, furnished and installed by the local branch office.**
- 1. Controls installation may be performed by a local subcontractor of JCI.**

2.2 The Facility Management Control System (FMCS) shall be comprised of a network of interoperable, stand-alone digital controllers. The FMCS shall incorporate LonWorks technology using Free Topology Transceivers (FTT-10), or BACnet MSTP485 or Ethernet in all unitary, terminal and other device controllers. The system shall include:

- A. Programmable Equipment Controllers (PEC's) for control of primary mechanical systems and distributed system applications. Controllers shall be fully programmable to create custom control solutions.
- B. Network Area Controllers (NAC's) for distributed system applications, databases and networking functions.
- C. Application Specific Controllers (ASC's) for control of Fan coil terminal units, Unit Vent terminal units, Heat Pump units and other terminal equipment.
- D. Graphical User Interface (GUI), which includes the hardware and software necessary for a user to interface with the control system and devices.

2.3 The controller network shall use twisted pair wiring or loop. The PEC and ASC network shall communicate at a minimum 78Kbps using BACnet or Lontalk. The GUI and NAC shall reside on an Ethernet backbone.

- 2.4 All components and controllers supplied under this contract shall be true "peer-to-peer" communicating devices.
- 2.5 NETWORK AREA CONTROLLER (NAC)
- A. The Network Area Controller (NAC) shall provide the interface between the field control devices, and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:
1. Calendar functions
  2. Scheduling
  3. Trending
  4. Alarm monitoring and routing
  5. Time synchronization
  6. Integration of LonWorks controller data
  7. Integration of BACnet and MODBUS networks
- B. The NAC shall provide multiple, concurrent user access to the system and support for ODBC or SQL. A database resident on the NAC shall be an ODBC-compliant database or must provide an ODBC data access mechanism to read and write data stored within it.
- C. The NAC shall support standard Web browser access via the Intranet/Internet. It shall be capable of supporting multiple users, expandable to fifty.
- D. The NAC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.
1. The NAC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.
  2. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including, but not limited to:
    - a. To alarm
    - b. Return to normal
    - c. To fault
  3. Provide for the creation of an unlimited number of alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, Fire, etc.
  4. Provide timed (schedule) routing of alarms by class, object, group, or node.
  5. Provide alarm generation from binary object "runtime" and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.
- E. Alarms shall be annunciated in any of the following manners as user defined:
1. Screen message text

2. Email of the complete alarm message to multiple recipients. **A list of required alarm points to be provided by owner.** Provide the ability to route and email alarms based on:
    - a. Day of week
    - b. Time of day
    - c. Recipient
  3. Pagers via paging services that initiate a page on receipt of email message
  4. Graphic with flashing alarm object(s)
  5. Cell phones
- F. The following shall be recorded by the NAC for each alarm (at a minimum):
1. Time and date
  2. Location (building, floor, zone, office number, etc.)
  3. Equipment (air handler #, accessway, etc.)
  4. Acknowledge time, date, and user who issued acknowledgement.
- G. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.
- H. A log of all alarms shall be maintained by the NAC and/or a server and shall be available for review by the user.
- I. Provide a "query" feature to allow review of specific alarms by user defined parameters.
- J. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.
- K. An Error Log to record system errors shall be provided and available for review by the user.
- L. Data Collection and Storage
1. The NAC shall collect data for any property of any object and store this data for future use.
  2. **A list of required trends shall be provided by the owner. Coordinate trending requirements during submittal phase.**
  3. The data collection shall be performed by log objects, resident in the NAC that shall have, at a minimum, the following configurable properties:
    - a. Designating the log as interval or deviation.
    - b. For interval logs, the object shall be configured for time of day, day of week and the sample collection interval.
    - c. For deviation logs, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object.
    - d. For all logs, provide the ability to set the maximum number of data stores for the log and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis.

- e. Each log shall have the ability to have its data cleared on a time-based event or by a user-defined event or action.
4. All log data shall be stored in a relational database in the NAC and the data shall be accessed from a standard Web Browser.
5. All log data, when accessed from a server, shall be capable of being manipulated using standard SQL statements.
6. All log data shall be available to the user in the following data formats:
  - a. HTML
  - b. XML
  - c. Plain Text
  - d. Comma or tab separated values
7. The NAC shall have the ability to archive its log data either locally (to itself), or remotely to a server or other NAC on the network. Provide the ability to configure the following archiving properties, at a minimum:
  - a. Archive on time of day
  - b. Archive on user-defined number of data stores in the buffer (size)
  - c. Archive when buffer has reached its user-defined capacity
- M. Provide and maintain an Audit Log that tracks all activities performed on the NAC. Provide the ability to specify a buffer size for the log and the ability to archive log based on time or when the log has reached its user-defined buffer size. Provide the ability to archive the log locally (to the NAC), to another NAC on the network, or to a server. For each log entry, provide the following data:
  1. Time and date
  2. User ID
  3. Change or activity: i.e., Change setpoint, add or delete objects, commands, etc.
- N. The NAC shall have the ability to automatically backup its database. The database shall be backed up based on a user-defined time of day.
  1. Copies of the current database and, at the most recently saved database shall be stored in the NAC. The age of the most recently saved database is dependent on the user-defined database save interval.
  2. The NAC database shall be stored, at a minimum, in XML format to allow for user viewing and editing, if desired. Other formats are acceptable as well, as long as XML format is supported.

## 2.6 PROGRAMMABLE EQUIPMENT CONTROLLERS (PEC)

- A. Programmable Equipment Controllers (PEC's) shall be stand-alone, multi-tasking, real-time digital control processors.
- B. The PEC's shall communicate via BACnet communication according to ASHRAE standard ANSI/ASHRAE 135-2004.
- C. The PEC must communicate peer-to-peer with all of the network application specific, programmable controllers.

- D. The PEC software database must be able to execute all of the specified mechanical system controls functions. The programming software shall be able to bundle software logic to simplify control sequencing. All values, which make up the PID output value, shall be readable and modifiable at a workstation or portable service tool. Each input, output, or calculation result shall be capable of being shared/bound with any controller or interface device on the network.
- E. Provide programming, engineering, and configuration tools used for the project duly licensed to the owner for owner's use.
- F. PEC's shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
- G. A single process shall be able to incorporate measured or calculated data from any and all other PEC's on the network. In addition, a single process shall be able to issue commands to points in any and all other PEC's on the network.
- H. Each PEC shall support firmware upgrades without the need to replace hardware.
- I. Each PEC shall continuously perform self-diagnostics, which include communication diagnosis and diagnosis of all components.
- J. In the event of the loss of normal power, there shall be an orderly shutdown of all PEC's to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and **battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.**
  - 1. Upon restoration of normal power, the PEC shall automatically resume full operation without manual intervention.
  - 2. All PEC's control programming and databases must be stored in Flash memory, therefore eliminating data loss, downtime and re-load time.
- K. Provide a separate PEC for each AHU or other HVAC system such that the inputs, calculations, and outputs shall reside on a single controller.

## 2.7 APPLICATION SPECIFIC CONTROLLERS (ASC)

- A. Each Application Specific Controller (ASC) shall operate as a stand-alone BacNet controller capable of performing its specified control responsibilities independent of other controllers in the network. Each ASC shall be a minimum 16-BIT microprocessor based, multi-tasking, multi-user, real time digital control processor.
- B. Controllers shall include all inputs and outputs necessary to perform the specified control sequences. Analog and digital outputs shall be industry standard signals such as 0-10V and 3-point floating control allowing for interface to a variety of industry standard modulating actuators. The ASC inputs and outputs shall consist of industry standards types. Inputs shall be electrically isolated from outputs, communications and power.
- C. All controller sequences and operation shall provide closed loop control of the intended application. Closing control loops over the network is not acceptable.

- D. The control program shall reside in the ASC. The application program and the configuration information shall be stored in non-volatile memory with no battery back-up required.
- E. After a power failure the ASC must run the control application using the current setpoints and configuration. Reverting to default or factory setpoints are not acceptable.

## 2.8 GRAPHICAL USER INTERFACE SOFTWARE (GUI)

- A. Contractor to create new system graphics pages and integrate them into the existing Metasys interface.
- B. Command of points from multiple manufacturers shall be transparent to the operator.
- C. Real-Time Displays. The Graphical User Interface (GUI), shall at a minimum, support the following graphical features and functions:
  - 1. Graphic screens shall be developed using any drawing package capable of generating a GIF, BMP, or JPG file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of a graphic background, the GUI shall support the use of scanned pictures and streaming video.
  - 2. Provide programming, engineering, and configuration tools used for the project duly licensed to the owner for owner's use.
  - 3. A gallery of HVAC and automation symbols shall be provided, including fans, valves, motors, chillers, AHU systems, standard ductwork diagrams and symbols. The user shall have the ability to add custom symbols to the gallery as required.
  - 4. Graphic screens shall contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.
  - 5. Graphics shall include layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.
  - 6. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.
    - a. Schedule times will be adjusted by mouse command using a graphical slider, without requiring any keyboard entry from the operator.
    - b. Holidays shall be set by mouse command using a graphical calendar, without requiring any keyboard entry from the operator.
  - 7. Commands to start and stop binary objects shall be done by mouse command from the pop-up menu. No entry of text shall be required.
- D. System Configuration. At a minimum, the GUI shall permit the operator to perform the following tasks, with proper password access:
  - 1. Create, delete or modify control strategies.
  - 2. Add/delete objects to the system.
  - 3. Tune control loops through the adjustment of control loop parameters.
  - 4. Enable or disable control strategies.



5. Generate hard copy records or control strategies on a printer.
  6. Select points to be alarmable and define the alarm state.
  7. Select points to be trended over a period of time and initiate the recording of values automatically.
- E. On-Line Help. Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in HTML format.
- F. Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.
- G. All graphic displays shall be provided using web browser client as specified in 2.11.
- H. The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm. The use of the Alarm Console can be enabled or disabled by the system administrator.
- I. When the Alarm Console is enabled, a separate alarm notification window will supercede all other windows on the desktop. This window will notify the operator of new alarms and un-acknowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable. The alarm console shall be loaded and operated at the following locations.

## 2.9 PROJECT SPECIFIC PAGES:

- A. Home page shall include a campus layout of the individual buildings at the site.
- B. Once an individual building is selected the following minimum web-based tree structure shall be provided:
1. Documents Page: The document page shall include the O&M Manuals for the control system in PDF format along with AutoCAD drawings for each drawing provided in the control system O&M Manual. This document page shall include links between the control diagrams and associated data sheet in PDF format, such that the system user shall be able to click on the control device and retrieve, in PDF format, the factory O&M sheets associated with that device.
  2. Station Functions:
    - a. Logging separate sheet of station functions for a particular selected building shall be the viewing of one or more logs or the creation of logs in which any value at any point, or the mode of any point, shall be selected via the web to

be trended against any other point with an adjustable frequency in seconds, minutes, hours or days.

- b. The alarm acknowledgement via the web shall allow the viewing and acknowledgement of the alarms.
  - c. Audit log shall be provided via the web to show the operator actions as well as other audit logs as specified in section 2.4 Network Area Controller (NAC) paragraph "M" Data Collection and Storage.
3. Floor Plans:
- a. AutoCAD drawings of floor plans shall be provided in the control system such that via the web the user shall be able to turn layers on and off on the mechanical floor plans. These floor plans shall also include an overlay of the temperature control as-built wiring for the project showing thermostat locations, communication runs, transformer locations, controller locations, etc.
  - b. Floor Display Summaries. The operator shall be able to select floor plans displaying the following formats:
    - 1) All zone temperatures
    - 2) All zone heating percentages
    - 3) All zone cooling percentages
    - 4) All zone room names and numbers as per architectural matrix and owner input.
    - 5) All zones cfm delivered.
4. Systems:
- a. On selecting the systems menu, a tree structure shall allow the operator to select the air handlers, fan coil units, energy recovery ventilators, etc. systems associated with that building. The graphics shall also show the piping and ductwork associated with the air handler as well as the safeties, temperature sensors, humidity sensors, dampers, VFD's, associated with that fan system. See points lists for specifics. Each system in the points list shall be treated as a branch of the above tree.
  - b. All devices that provide dynamic function in the primary equipment, i.e., fans, pumps, coils, dampers shall be dynamic in nature showing their operating status/percentage of capacity by movement on the web page.
  - c. The set points for the various control loops shall be adjustable via the web page. Individual controlled devices, i.e., valves, dampers, fans shall be controlled via the web page and be stopped or started or placed in a command state or percentage of value output.

## 2.10 FIELD DEVICES

- A. Provide automatic control valves, automatic control dampers, thermostats, clocks, sensors, controllers, and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer.

### B. Temperature Sensors

1. Temperature Sensors: Temperature sensors shall be linear precision elements with ranges appropriate for each specific application.
  2. Space (room) sensors shall be available with setpoint adjustment and override switch.
  3. Duct mounted averaging sensors shall utilize a sensing element incorporated in a copper capillary with a minimum length of 20 feet. The sensor shall be installed according to manufacture recommendation and looped and fastened at a minimum of every 36 inches.
  4. Sunshields shall be provided for outside air sensors.
  5. Thermo-wells for all immersion sensors shall be stainless steel or brass as required for the application.
- C. Humidity Sensors: Humidity sensors shall be of the solid-state type using a capacitance-sensing element. The sensor shall vary the output voltage with a change in relative humidity. Room humidity sensors shall have a minimum range of 10% to 90%  $\pm$ 5%. Supply air humidity sensors shall have a range of 10% to 90%  $\pm$  5%.
- D. Pressure Sensors: The differential pressure sensor shall be temperature compensated and shall vary the output voltage with a change in differential pressure. Sensing range shall be suitable for the application with linearity of 1.5% of full scale and offset of less than 1% of full scale. Sensor shall be capable of withstanding up to 150% of rated pressure without damage.
- E. Flat plate (flush mount) temperature sensors shall be installed in public corridors, behavior health and any other locations where gurneys and/or carts could damage sensors and where public access of setpoint is not desired.
- F. Switches and Thermostats
1. The FMCS Contractor shall furnish all electric relays and coordinate with the supplier of magnetic starters for auxiliary contact requirements. All electric control devices shall be of a type to meet current, voltage, and switching requirement of their particular application. Relays shall be provided with 24 VAC coils and contacts shall be rated at 10 amps minimum.
  2. Duct Smoke Detectors: Duct smoke detectors shall be supplied by others with an integral auxiliary contact to be used by the FMCS contractor to provide a digital input to the FMCS.
  3. Low Temperature Detection Thermostats: Shall be the manual reset type. The thermostat shall operate in response to the coldest one-foot length of the 20-foot sensing element, regardless of the temperatures at other parts of the element. The element shall be properly supported to cover the entire downstream side of the coil with a minimum of three loops. Separate thermostats shall be provided for each 25 square feet of coil face area or fraction thereof.
  4. Differential Pressure Switches: Pressure differential switches shall have SPDT changeover contact, switching at an adjustable differential pressure setpoint.
  5. Current Sensing Relays: Motor status indications, where shown on the plans, shall be provided via current sensing relays. The switch output contact shall be rated for 30 VDC, .15 amps.
  6. Flow Switches: Motor status indications, where shown on the plans, shall be provided via flow switches. Flow switches shall be of the paddle type equipped with SPDT contacts to establish proof of flow.

7. Carbon Monoxide Detector and Controller shall meet or exceed UL 2034 standard and OSHA standards for CO exposure. Controller shall be solid state sensor. Fan relay shall activate at 35 ppm of CO averaged over 5 minutes. Alarm relay shall activate at 100 ppm after 30 minutes. Approved manufacturers shall be Macurco, Inc or approved equal.

#### G. Control Valves

1. General: Control Valves up to 4 inches shall be globe valves and shall be sized for a 3 to 5 psi pressure drop. Valves shall be packless, modulating, electrically or magnetically actuated, with a control rangeability of 100 to 1. These valves shall have equal percentage flow characteristics in relationship to valve opening.
2. ½ inch to 4 inch: Valves shall be equipped with handwheel, or manual position mounted dial adjacent to valve, to allow manual positioning of valve in absence of control power. (Valves with a rangeability of less than 200 to 1 shall utilize two valves in a 1/3 – 2/3 parallel arrangement in order to achieve control rangeability).
3. 4 inches to 6 inches: Valves for heating shall be globe valves modulating electrically actuated, 2-way or 3-way as required, with a rangeability of 50 to 1. Valve body shall be flanged and shall be equipped with a handwheel, or manual position dial mounted adjacent to the valve, to allow manual positioning of the valve in the absence of control power. Valves for cooling shall be butterfly with a rangeability of 25 to 1.
4. Butterfly Valves: 2-way and 3-way butterfly valves shall be cast iron valve body, with stainless steel stem, and available with disc seal for bubble-tight shut off.
5. Steam Valves: Valves shall have an ANSI Class 250 lb. body, teflon v-ring packing rated to 377°F., stainless steel trim rated to 50 psi, with rangeability greater than 100:1, Class 4 leakage and close off rating, linear flow characteristics, via perforated throttling cylinder.

#### H. Damper Actuators

1. Actuators shall be of the push-pull or rotary type of modulating, 3-point floating, or 2-position control as required by the application. The actuator shall use an overload-proof synchronous motor or an electric motor with end switches to de-energize the motor at the end of the stroke limits. Control voltage shall be 24 VAC, 0-20 VDC, or 4-20 ma as required. Actuators shall be available with spring return to the normal position when required. Actuators shall have a position indicator for external indication of damper position. Actuators shall have manual override capability without disconnecting damper linkage.

#### I. Control Dampers

1. Motorized dampers, unless otherwise specified elsewhere, shall have damper frames using 13 gauge galvanized steel channel or 1/8" extruded aluminum with reinforced corner bracing. Damper blades shall not exceed ten (10) inches in width or 48" in length. Blades are to be suitable for high velocity performance. Damper bearings shall be as recommended by manufacturer for application. Bushings that turn in the bearing are to be oil impregnated sintered metal. All blade edges and top and bottom of the frame shall be provided with replaceable, butyl rubber or neoprene seals. Side seals may be spring-loaded stainless steel. The seals shall provide a maximum of 1% leakage at a wide open face velocity of 1500 FPM and 4: W.C. close-off pressure. The damper linkage

shall provide a linear flow or equal percentage characteristic as required.  
Provide Ruskin RCD46 model or equal.

2. Control dampers shall be parallel or opposed blade type as scheduled on drawings or outdoor and return air mixing box dampers shall be parallel blade, arranged to direct air streams towards each other. All other dampers may be parallel or opposed blade types.

### PART 3 - EXECUTION

#### 3.1 PROJECT MANAGEMENT

- A. Provide a project manager who shall, as a part of his duties, be responsible for the following activities:
  1. Coordination between the Controls Contractor and all other trades, Owner, local authorities and the design team.
  2. Scheduling of manpower, material delivery, equipment installation and checkout.
  3. Maintenance of construction records such as project scheduling and manpower planning and AutoCAD or Visio for project co-ordination and as-built drawings.
  4. Coordination/Single point of contact

#### 3.2 INSTALLATION METHODS

- A. Install systems and materials in accordance with manufacturer's instructions, rough-in drawings and equipment details. Install electrical components and use electrical products complying with requirements of applicable Division-16 sections of these specifications.
- B. The term "control wiring" is defined to include providing of wire, conduit, and miscellaneous materials as required for mounting and connecting electric or electronic control devices.
- C. To run BACnet on the ethernet network, the installer is required to run, at minimum, plenum rated CAT 5e cabling for all runs associated with this network.
- D. All exposed wiring, low and line voltage subject to mechanical damage, shall be run in conduit. Line and low voltage wiring shall be run in separate conduits. Concealed but accessible wiring, except in mechanical rooms and areas where other conduit and piping are exposed shall run in UL plenum rated cable as approved by local codes unless expressly restricted by requirements in Division 16 specification.
- E. All Controllers, Relays, Transducers, etc., required for stand-alone control shall be housed in a NEMA 1 enclosure with a lockable door.

#### 3.3 SYSTEM ACCEPTANCE

- A. General: The system installation shall be complete and tested for proper operation prior to acceptance testing for the Owner's authorized representative. A letter shall

be submitted to the Architect requesting system acceptance. This letter shall certify all controls are installed and the software programs have been completely exercised for proper equipment operation. Acceptance testing will commence at a mutually agreeable time within ten (10) calendar days of request. When the field test procedures have been demonstrated to the Owner's representative, the system will be accepted. The warranty period will start at this time.

- B. Field Equipment Test Procedures: DDC control panels shall be demonstrated via a functional end to end test. Such that:
1. **Owner to provide a pre-functional and functional checklist(s) for the verification of proper integration of the new mechanical items. Contractor to review and sign off all the pre-functional and functional checklist(s) provided after installation is complete. Contractor to return signed copies of checklists to the engineer and owner.**
  2. All output channels shall be commanded (on/off, stop/start, adjust, etc.) and their operation verified.
  3. All analog input channels shall be verified for proper operation.
  4. All digital input channels shall be verified by changing the state of the field device and observing the appropriate change of displayed value.
  5. If a point should fail testing, perform necessary repair action and retest failed point and all interlocked points.
  6. Automatic control operation shall be verified by introducing an error into the system and observing the proper corrective system response.
  7. Selected time and setpoint schedules shall be verified by changing the schedule and observing the correct response on the controlled outputs.
- C. As-Built Documentation: After a successful acceptance demonstration, the Contractor shall submit as-built drawings of the completed project for final approval. After receiving final approval, supply "6" complete as-built drawing sets, together with AutoCAD or Visio diskettes to the owner.
- D. Operation and Maintenance Manuals: **Submit three (3) hard copies and one (1) searchable pdf copy** of the operation and maintenance manuals. Include the following
1. Manufacturer's catalog data and specifications on sensors, transmitters, controllers, control valves, damper actuators, gauges, indicators, terminals, and any miscellaneous components used in the system.
  2. An operator's manual that will include detailed instructions for all operations of the system.
  3. An operator's reference table listing the addresses of all connected input points and output points. Settings shall be shown where applicable.
  4. A copy of the warranty/guarantee.
  5. Operating and maintenance cautions and instructions.

### 3.4 TRAINING

- A. Factory trained control engineers and technicians shall provide training sessions for the Owner's personnel.

- B. The control contractor shall conduct a (4) four-hour onsite training course of the new graphic pages for the designated Owner's personnel.

### 3.5 WARRANTY/GUARANTEE

- A. The control system shall be warranted/guaranteed to be free from defects in both material and workmanship for a period of one (1) year of normal use and service. This warranty/guarantee shall become effective the date the owner accepts or receives beneficial use of the system.
- B. After completion this contractor shall make adjustments and modification as necessary for the one year warranty period. During this period the contractor as directed by the engineer shall make modifications and adjustments to the building systems at no additional cost or compensation.

## PART 4 - SEQUENCES OF OPERATION

### 4.1 VAV DUAL DUCT

- a. Occupied mode of the zone controller shall be determined by the building automation system (BAS). In the occupied mode, if the temperature is between the heating temperature and the cooling temperature setpoint, the box shall be in a dead band mode. The local DDC control loop shall modulate the primary damper to maintain the ventilation minimum CFM setpoint. On a fall in space temperature equal to the heating temperature setpoint. The control shall then modulate the hot deck supply air volume between the heating minimum and the heating maximum setpoint. The heating volume shall be a function of the heating calculation percentage. On a 100% call for heat the VAV box shall control to the maximum heating velocity setpoint.
- b. The reverse shall occur on an increase in space temperature equal to or greater than the heating temperature setpoint. When the space temperature is equal to or greater than the cooling temperature setpoint, the VAV box processor shall enter the cooling mode. The controller shall reset the cold deck box CFM setpoint from the minimum ventilation setpoint to the cooling maximum setpoint. When the space temperature falls back to the cooling setpoint, the cold deck CFM setpoint shall be reduced back to the minimum ventilation setpoint.
- c. In the unoccupied mode the heating and cooling CFM setpoints shall be controlled using the unoccupied heating and cooling setpoints

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**SECTION 233001 - COMMON DUCT REQUIREMENTS**

PART 1 - PRODUCTS

1.1 SUMMARY

A. Includes But Not Limited To:

1. General procedures and requirements for ductwork.
2. Repair leaks in ductwork, as identified by smoke test, at no additional cost to Owner.
3. Soundproofing procedures for duct penetrations of walls, ceilings, and floors in mechanical equipment rooms.

B. Related Sections:

1. Division 07: Quality of Acoustic Sealant.
2. Section 23 0500: Common Work Results for HVAC
3. Section 23 0593: Testing Adjusting and Balancing for HVAC.

1.2 SUBMITTALS

A. Samples: Sealer and gauze proposed for sealing ductwork.

B. Quality Assurance / Control:

1. Manufacturer's installation manuals providing detailed instructions on assembly, joint sealing, and system pressure testing for leaks.
2. Specification data on sealer and gauze proposed for sealing ductwork.

1.3 QUALITY ASSURANCE

A. Requirements: Construction details not specifically called out in Contract Documents shall conform to applicable requirements of SMACNA HVAC Duct Construction Standards.

B. Pre-Installation Conference: Schedule conference immediately before installation of ductwork.

## PART 2 - PRODUCTS

- 2.1 Finishes, Where Applicable: Colors as selected by Architect.
- 2.2 Duct Hangers:
- A. One inch by **18 ga** galvanized steel straps or steel rods as shown on Drawings, and spaced not more than **96 inches** apart. Do not use wire hangers.
    - 1. Attaching screws at trusses shall be **2 inch** No. 10 round head wood screws. Nails not allowed.
    - 2. Attach threaded rod to steel joist with Grinnell Steel washer plate Fig. 60 - ph-1. Double nut connection.
- 2.3 Penetration Soundproofing Materials:
- A. Insulation for Packing: Fiberglass.
  - B. Calking: Polysulphide.
  - C. Escutcheon Frame: **22 ga** galvanized iron **2 inches** wide.

## PART 3 - EXECUTION

- 3.1 INSTALLATION
- A. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.
  - B. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.
  - C. Hangers And Supports:
    - 1. Install pair of hangers close to each transverse joint and elsewhere as required by spacing indicated in table on Drawings.
    - 2. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
    - 3. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
    - 4. Where hangers are secured to forms before concrete slabs are poured, cut off flush all nails, strap ends, and other projections after forms are removed.
    - 5. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

D. Penetration Soundproofing

1. Pack space between ducts and structure full of fiberglass insulation of sufficient thickness to be wedged tight, allowing space for application of caulking.
2. Provide caulking at least **2 inches** thick between duct and structure on both ends of opening through structure.
3. Provide metal escutcheon on Equipment Room side. Secure escutcheon to wall.

3.2 CLEANING

- A. Clean interior of duct systems before final completion.

END OF SECTION

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**SECTION 233113 - METAL DUCTS**

## 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. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.

## B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.
3. Section 230713 "Duct Insulation" for duct insulation and fire wrap.

## 1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

## 1.4 ACTION SUBMITTALS

## A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

## B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
- 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.**
13. Duct fabrication shall not begin until shop drawings have been submitted and reviewed by the mechanical engineer.

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.
- 5. Design Calculations: Calculations for selecting hangers and supports.**

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
  2. Suspended ceiling components.
  3. Structural members to which duct will be attached.
  4. Size and location of initial access modules for acoustical tile.
  5. Penetrations of smoke barriers and fire-rated construction.
  6. Items penetrating finished ceiling including, but not limited to the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Access panels.
    - f. Perimeter moldings.
- B. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to **AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.**
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
  - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
  - 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

## PART 2 - PRODUCTS

## 2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Duct dimensions shown on drawings are inside clear dimensions.
- E. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 **SINGLE-WALL ROUND** DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

- B. Duct dimensions shown on drawings are inside clear dimensions.
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - 1. Transverse Joints in Ducts Larger Than **60 inches** in Diameter: Flanged.
- D. Longitudinal Seams: Not allowed.
- E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

## 2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653.
  - 1. Galvanized Coating Designation: **G90**.
  - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Reinforcement Shapes and Plates: ASTM A 36, steel plates, shapes, and bars; black and galvanized.
  - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- D. Tie Rods: Galvanized steel, **1/4-inch** minimum diameter for lengths **36 inches** or less; **3/8-inch** minimum diameter for lengths longer than **36 inches**.

## 2.4 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed Corporation; Insulation Group.
    - b. Johns Manville.
    - c. Knauf Insulation.



- d. Owens Corning.
  2. Maximum Thermal Conductivity:
    - a. Type I, Flexible: **0.27 Btu x in./h x sq. ft. x deg F at 75 deg F** mean temperature.
    - b. Type II, Rigid: **0.23 Btu x in./h x sq. ft. x deg F at 75 deg F** mean temperature.
  3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
  4. Water-Based Liner Adhesive:
    - a. Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
    - b. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Insulation Pins and Washers:
1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, , length to suit depth of insulation indicated with integral **1-1/2-inch** galvanized carbon-steel washer.
    - a. **0.135-inch**-diameter shank.
  2. Insulation-Retaining Washers: With beveled edge sized as required to hold insulation securely in place but not less than **1-1/2 inches** in diameter.
    - a. Self-locking washers formed from **0.016-inch-thick aluminum**.
- C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
  2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
  3. Butt transverse joints without gaps, and coat joint with adhesive.
  4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
  5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
  6. Secure liner with mechanical fasteners **4 inches** from corners and at intervals not exceeding **12 inches** transversely; at **3 inches** from transverse joints and at intervals not exceeding **18 inches** longitudinally.
  7. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
    - a. Fan discharges.
    - b. Intervals of lined duct preceding unlined duct.

8. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
  - a. Sheet Metal Inner Duct Perforations: **3/32-inch** diameter, with an overall open area of 23 percent.
9. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated build-outs (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

## 2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
  1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
  2. Tape Width: **4 inches**.
  3. Sealant: Modified styrene acrylic.
  4. Water resistant.
  5. Mold and mildew resistant.
  6. Maximum Static-Pressure Class: **10-inch wg**, positive and negative.
  7. Service: Indoor and outdoor.
  8. Service Temperature: **Minus 40 to plus 200 deg F**.
  9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
  10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Based Joint and Seam Sealant:
  1. Application Method: Brush on.
  2. Solids Content: Minimum 65 percent.
  3. Shore A Hardness: Minimum 20.
  4. Water resistant.
  5. Mold and mildew resistant.
  6. VOC: Maximum 75 g/L (less water).
  7. Maximum Static-Pressure Class: **10-inch wg**, positive and negative.
  8. Service: Indoor or outdoor.
  9. Substrate: Compatible with galvanized sheet steel, stainless steel, or aluminum sheets.
- D. Solvent-Based Joint and Seam Sealant:
  1. Application Method: Brush on.

2. Base: Synthetic rubber resin.
  3. Solvent: Toluene and heptane.
  4. Solids Content: Minimum 60 percent.
  5. Shore A Hardness: Minimum 60.
  6. Water resistant.
  7. Mold and mildew resistant.
  8. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  9. VOC: Maximum 395 g/L.
  10. Maximum Static-Pressure Class: **10-inch wg**, positive or negative.
  11. Service: Indoor or outdoor.
  12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- E. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
  2. Type: S.
  3. Grade: NS.
  4. Class: 25.
  5. Use: O.
  6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- G. Round Duct Joint O-Ring Seals:
1. Seal shall provide maximum leakage class of **3 cfm/100 sq. ft. at 1-inch wg** and shall be rated for **10-inch wg** static-pressure class, positive or negative.
  2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
  3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

## 2.6 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," **Table 5-1**, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
  - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
  - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
  - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

### PART 3 - EXECUTION

#### 3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install **round** ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of **2 inch**, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least **1-1/2 inches**.

- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. **Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines" .**

### 3.2 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
  - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
  - 2. **Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class A.**
  - 3. **Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.**
  - 4. **Conditioned Space, Exhaust Ducts: Seal Class A.**
  - 5. **Conditioned Space, Return-Air Ducts: Seal Class A.**

### 3.3 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  - 1. Where practical, install concrete inserts before placing concrete.
  - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than **4 inches** thick.
  - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than **4 inches** thick.
  - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," **Table 5-1**, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within **24 inches** of each elbow and within **48 inches** of each branch intersection.

- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of **16 feet**.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

### 3.4 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with the requirements specified in Section 230548 "Vibration and Seismic Controls for HVAC."
  - 1. Comply with **ASCE/SEI 7**.

### 3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

### 3.6 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

### 3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
  - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
  - 2. Test the following systems:
    - a. Supply Ducts with a Pressure Class of **2-Inch wg** or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
    - b. Return Ducts with a Pressure Class of **2-Inch wg** or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.

- c. Exhaust Ducts with a Pressure Class of **2-Inch wg** or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
    3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
    4. Test for leaks before applying external insulation.
    5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
    6. Give **seven** days' advance notice for testing.
  - C. Duct System Cleanliness Tests:
    1. Visually inspect duct system to ensure that no visible contaminants are present.
    2. Any liner showing evidence that it has wet at any time shall be removed and replaced with new liner.
      - a. Disinfect affected sheet metal, and pins.
      - b. Install new liner per specifications
      - c. Seal friable edges and seams of repaired liner.
  - D. Duct system will be considered defective if it does not pass tests and inspections.
  - E. Prepare test and inspection reports.
- 3.8 DUCT CLEANING
- A. Clean **new** duct system before testing, adjusting, and balancing.
  - B. Use service openings for entry and inspection.
    1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
    2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
    3. Remove and reinstall ceiling to gain access during the cleaning process.
  - C. Particulate Collection and Odor Control:
    1. When venting vacuuming system inside the building, use HEPA filtration with **99.97 percent** collection efficiency for **0.3-micron-size** (or larger) particles.
    2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
  - D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

### 3.9 START UP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

### 3.10 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel.
- B. Ductwork running in areas where there are no ceilings or when noted on the drawings shall be doubled wall duct and shall meet the requirements indicated below.
- C. Supply Ducts:
1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:



- a. Pressure Class: Positive **2-inch wg.**
  - b. Minimum SMACNA Seal Class: **A.**
  - c. Minimum SMACNA Seal Class: **A.**
  - d. SMACNA Leakage Class for Rectangular: **16.**
  - e. SMACNA Leakage Class for Round: **8.**
2. Ducts Connected to Variable-Air-Volume Air-Handling Units:
    - a. Pressure Class: Positive **6-inch wg.**
    - b. Minimum SMACNA Seal Class: **A.**
    - c. SMACNA Leakage Class for Rectangular: **4.**
    - d. SMACNA Leakage Class for Round: **2.**
  3. Ducts Connected to Equipment Not Listed Above:
    - a. Pressure Class: Positive **4-inch wg.**
    - b. Minimum SMACNA Seal Class: **A.**
    - c. SMACNA Leakage Class for **Rectangular: 4.**
    - d. SMACNA Leakage Class for Round: **2.**
- D. Return Ducts:
1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
    - a. Pressure Class: Positive or negative **2-inch wg.**
    - b. Minimum SMACNA Seal Class: **A.**
    - c. SMACNA Leakage Class for Rectangular: **16.**
    - d. SMACNA Leakage Class for Round: **8.**
  2. Ducts Connected to Air-Handling Units:
    - a. Pressure Class: Positive or negative **2-inch wg.**
    - b. Minimum SMACNA Seal Class: **A.**
    - c. SMACNA Leakage Class for Rectangular: **16.**
    - d. SMACNA Leakage Class for Round: **8.**
  3. Ducts Connected to Equipment Not Listed Above:
    - a. Pressure Class: Positive or negative **3-inch wg.**
    - b. Minimum SMACNA Seal Class: **A.**
    - c. SMACNA Leakage Class for Rectangular: **8.**
    - d. SMACNA Leakage Class for Round: **4.**
- E. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
  - a. Pressure Class: Negative **2-inch wg.**
  - b. Minimum SMACNA Seal Class: **A.**
  - c. SMACNA Leakage Class for Rectangular: **16.**
  - d. SMACNA Leakage Class for Round: **4.**
- F. Intermediate Reinforcement:
  1. Galvanized-Steel Ducts: **Galvanized steel.**
- G. **Duct Liner Restrictions:**
  1. **Duct liner exposed to air movement shall not be used in supply air ducts serving the following rooms: Operating rooms, trauma rooms, LDR rooms, NICU nurseries, ICU nurseries, positive pressure isolation rooms, cath labs, bone marrow, triage rooms, angiogram rooms, fluoroscopy rooms, linear accelerators, decontamination areas and any invasive procedure rooms where the duct insulation could be a source of contamination.**
  2. **Duct Liner exposed to air movement shall not be used on medium pressure ductwork (2000 to 4000 FPM velocity). See section 230713 "Duct Insulation" for insulation requirements.**
  3. **All duct liner shall meet all of the requirements found in 2018 IECC**
- H. Liner: (Ductwork located Interior to building Insulated Envelope)
  1. Low Pressure Supply Air Ducts (Less than 2000 FPM velocity): **Fibrous glass, Type I, 1 inch** thick with a minimum R value of 4.0 for ducts in unconditioned spaces.
  2. Supply Air Ducts: **Fibrous glass, Type I, 1 inch** thick for ducts in conditioned spaces.
  3. Return Air Ducts: **Fibrous glass, Type, 1 inch** thick for ducts in conditioned spaces.
  4. Exhaust Air Ducts: **Fibrous glass, Type I, 1 inch** thick.
- I. Elbow Configuration:
  1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
    - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
    - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
    - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
  - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
    - 1) Velocity **1000 fpm** or Lower: 1.0 radius-to-diameter ratio and three segments for 90-degree elbow.
    - 2) Velocity **1000 to 1500 fpm**: 1.5 radius-to-diameter ratio and four segments for 90-degree elbow.
    - 3) Velocity **1500 fpm** or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
    - 4) Radius-to Diameter Ratio: 1.5.
  - b. Round Elbows, **12 Inches** and Smaller in Diameter: Stamped or pleated.
  - c. Round Elbows, **14 Inches** and Larger in Diameter: Welded.
- J. Branch Configuration:
  1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
    - a. Rectangular Main to Rectangular Branch: 45-degree entry high efficiency take-off.
    - b. Rectangular Main to Round Branch: 45-degree entry high efficiency take-off.
  2. **Round:**
    - a. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
    - b. Velocity **1000 to 1500 fpm**: **45-degree entry high efficiency tap.**
    - c. Velocity **1500 fpm** or Higher: 45-degree lateral.

END OF SECTION

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**SECTION 233300 - AIR DUCT ACCESSORIES**

## 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. Backdraft dampers.
2. Manual volume dampers.
3. Control dampers.
4. Fire dampers.
5. Smoke dampers.
6. Combination fire and smoke dampers.
7. Turning vanes.
8. Remote damper operators.
9. Duct-mounted access doors.
10. Flexible connectors.
11. Flexible ducts.
12. Duct accessory hardware.
13. High efficiency take-offs.

- B. Related Requirements:

1. Division 23 "Diffusers, Registers and Grilles".
2. Division 28 "Digital, Addressable Fire-Alarm System" for duct-mounted fire and smoke detectors.
3. Division 28 "Zoned (DC-Loop) Fire-Alarm System" for duct-mounted fire and smoke detectors.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and

method of field assembly into duct systems and other construction. Include the following:

- a. Special fittings.
- b. Manual volume damper installations.
- c. Control-damper installations.
- d. Fire-damper, smoke-damper, combination fire- and smoke-damper, pressure relief-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
- e. Wiring Diagrams: For power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- B. Source quality-control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

#### 1.6 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. Fusible Links: Furnish quantity equal to **10** percent of amount installed.

### PART 2 - PRODUCTS

#### 2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

#### 2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653.

1. **Galvanized Coating Designation: G60.**
  2. Exposed-Surface Finish: Mill phosphatized.
- B. Aluminum Sheets: Comply with **ASTM B 209**, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- C. Extruded Aluminum: Comply with **ASTM B 221**, Alloy 6063, Temper T6.
- D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- E. Tie Rods: Galvanized steel, **1/4-inch** minimum diameter for lengths **36 inches** or less; **3/8-inch** minimum diameter for lengths longer than **36 inches**.

### 2.3 BACKDRAFT DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Warming and Ventilating; a division of Mestek, Inc.
  2. Greenheck Fan Corporation.
  3. Nailor Industries Inc.
  4. Pottorff.
  5. Ruskin Company.
  6. United Enertech
- B. Function:
1. Designed to allow airflow in one direction and prevent reverse airflow.
  2. Keeps outside air out of the space by sensing and closing against mass flow.
- C. Description:
1. Gravity balanced.
- D. Maximum Air Velocity:
1. **1000 fpm**
- E. Maximum System Pressure:
1. **3-inch wg.**
  2. **4-inch wg.**
- F. Frame: Hat-shaped, with welded corners or mechanically attached and mounting flange:
1. **16GA 0.063-inch- thick extruded aluminum.**
- G. Blades: Multiple single-piece blades, maximum **6-inch** width noncombustible, tear-resistant, neoprene-coated fiberglass with sealed edges:
1. **Center pivoted: 16GA 0.050-inch- thick aluminum sheet.**
- H. Blade Action: Parallel.
- I. Blade Seals: Mechanically locked.

**1. Neoprene.**

J. Blade Axles: **0.20 inch** diameter:  
1. **Material: Nonferrous metal.**

K. Tie Bars and Brackets:

1. **Aluminum .**

L. Return Spring: Adjustable tension.

M. Bearings:

1. **Synthetic pivot bushings.**

N. Accessories.

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Screen Mounting: Front mounted in sleeve.

- a. Sleeve Thickness: **20 gage** minimum.
- b. Sleeve Length: **6 inches** minimum.

4. Screen Mounting: Rear mounted.

5. Screen Material:  
**a. Aluminum.**

6. Screen Type:  
**a. Bird**

7. 90-degree stops.

## 2.4 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

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

- a. American Warming and Ventilating; a division of Mestek, Inc.
- b. McGill AirFlow LLC.
- c. Nailor Industries Inc.
- d. Pottorff.
- e. Ruskin Company.
- f. United Enertech

2. Standard leakage rating , **with linkage outside airstream .**

3. Suitable for horizontal or vertical applications.

4. Frames: Hat-shaped, Mitered and welded corners. Flanges for attaching to walls and flangeless frames for installing in ducts.

**a. 16GA 0.064-inch thick, galvanized sheet steel.**

5. Blades:

- a. Multiple or single blade. Parallel- or opposed-blade design. Stiffened damper blades for stability.



- b. Material:
  - 1) **Galvanized -steel, 16GA 0.064 inch thick.**
- 6. Blade Axles:
  - a. **Nonferrous metal**
  - b. Shall extend full length of damper blades in ducts with pressure classes of **3-inch wg** or more.
- 7. Bearings:
  - a. Material:
    - 1) **Molded synthetic.**
  - b. Bearings at both ends of damper operating shafts in ducts with pressure classes of **3-inch wg** or more.
- 8. Tie Bars and Brackets: Galvanized steel.
- B. Jackshaft:
  - 1. Size:
    - a. **1-inch diameter.**
  - 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
  - 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- C. Damper Hardware:
  - 1. Zinc-plated, die-cast core with dial and handle made of **3/32-inch-** thick zinc-plated steel, and a **3/4-inch** hexagon locking nut.
  - 2. Include center hole to suit damper operating-rod size.
  - 3. Include elevated platform for insulated duct mounting.

## 2.5 CONTROL DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Greenheck Fan Corporation.
  - 2. Pottorff.
  - 3. Ruskin Company.
  - 4. Young Regulator Company.
  - 5. United Enertech
- B. Low-leakage rating, **with linkage outside airstream**, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
- C. Frames:
  - 1. Section:
    - a. **Hat** shaped.
  - 2. Material:
    - a. **20 GA 0.40-inch- thick galvanized steel .**

3. Corners:
    - a. **Mitered-and-welded.**
  - D. Blades: Multiple.
    1. Maximum blade width:
      - a. **6 inches.**
    2. **Opposed -blade design.**
    3. Material:
      - a. **Galvanized-steel.**
    4. Thickness:
      - a. **20 GA 0.40-inch- thick galvanized steel**
    5. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
      - a. **Closed-cell neoprene**
  - E. Blade Axles:
    1. Section:
      - a. **3/8-inch-square**
    2. Material:
      - a. **Galvanized steel.**
    3. Blade-linkage hardware:
      - a. Zinc-plated steel and brass.
      - b. Ends sealed against blade bearings:
    4. Operating Temperature Range: From **minus 40 to plus 200 deg F.**
  - F. Bearings:
    1. Type:
      - a. **Molded synthetic.**
    2. Axles: Dampers in ducts with pressure classes of **3-inch wg** or more shall have axles full length of damper blades.
    3. Bearings: Thrust bearings at each end of every blade. Bearings at both ends of each operating shaft.
- 2.6 FIRE DAMPERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    1. Arrow United Industries; a division of Mestek, Inc.
    2. Greenheck Fan Corporation.
    3. Nailor Industries Inc.
    4. Pottorff.
    5. Ruskin Company.
    6. United Enertech
  - B. Type:
    1. **Dynamic.**
  - C. Standard: Rated and labeled according to UL 555 by an NRTL.

- D. Closing rating in ducts up to **4-inch wg** static pressure class and minimum **2000-fpm** velocity.
- E. Fire Rating:
  - 1. **1-1/2 hours.**
- F. Frame:
  - 1. **Curtain type with blades outside airstream.**
  - 2. Material:
    - a. Fabricated with roll-formed galvanized steel; with mitered and interlocking corners.
    - b. Thickness:
      - 1) **20GA-0.040-inch-.**
- G. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel. Length to suit application.
  - 1. Minimum Thickness:
    - a. **18GA-0.05 inch, as indicated.**
  - 2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.
- H. Mounting Orientation: Vertical or horizontal as indicated.
- I. Blades: Roll-formed, interlocking, galvanized sheet steel.
  - 1. Thickness:
    - a. **24GA-0.024-inch-**
  - 2. In place of interlocking blades, use full-length, **0.034-inch-** thick, galvanized-steel blade connectors.
- J. Horizontal Dampers: Include blade lock and Type 301 constant force stainless-steel closure spring.
- K. **Heat-Responsive Device:** Replaceable, **212 deg F** rated, fusible links.

## 2.7 SMOKE DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Greenheck Fan Corporation.
  - 2. Nailor Industries Inc.
  - 3. Pottorff.
  - 4. Ruskin Company.
  - 5. United Enertech
- B. General Requirements: Label according to UL 555S by an NRTL.
- C. Smoke Detector: Integral, factory wired for single-point connection.
  - 1. Type: Photoelectric.

- D. Frame: Galvanized sheet steel. With or without mounting flange as required.
  - 1. Thickness:
    - a. **Hat-shaped, 16GA-0.064-inch.**
  - 2. Corners:
    - a. **Welded.**
  
- E. Blades: Horizontal, galvanized sheet steel.
  - 1. Section;
    - a. **Roll-formed.**
  - 2. Fit:
    - a. **Interlocking.**
  - 3. Thickness:
    - a. **14GA-0.079-inch.**
  
- F. Leakage:
  - 1. **Class II.**
  
- G. Seals:
  - 1. Blade: Inflatable silicone fiberglass material to maintain smoke leakage rating to a minimum of **450 deg F** .
  
- H. Rated pressure and velocity to exceed design airflow conditions.
  
- I. Mounting Sleeve: Factory-installed, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone calking.
  - 1. Minimum **17-inches** long.
  - 2. Thickness:
    - a. **0.05-inch-**.
  
- J. Damper Motors:
  - 1. Action:
    - a. **Two-position**
  - 2. Mode: Fail close.
  - 3. Mounting: External.
  
- K. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
  - 1. Electrical Connection: **115 V, single phase, 60 Hz** .
  
- L. Accessories:
  - 1. Auxiliary switches for signaling:
    - a. **Position indication.**
  - 2. Test Switch type:
    - a. **Momentary test switch.**
  - 3. Test Switch Mounting:
    - a. **Damper.**

## 2.8 COMBINATION FIRE AND SMOKE DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Greenheck Fan Corporation.
  2. Nailor Industries Inc.
  3. Pottorff.
  4. Ruskin Company.
  5. United Enertech
- B. Type: Dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.
- C. Closing rating in ducts up to **4-inch wg** static pressure class and minimum velocity of:
1. **4000-fpm**
- D. Fire Rating:
1. **1-1/2 hours.**
- E. Frame: Hat shaped, galvanized sheet steel. With or without mounting flange as required.
1. Thickness:
    - a. **16GA-0.064-inch**
  2. Corners:
    - a. **Welded.**
- F. **Heat-Responsive Device:** Replaceable, **212 deg F** rated, fusible links.
- G. Blades: Horizontal, galvanized sheet steel.
1. Type:
    - a. **Air-foil.**
  2. Fit:
    - a. **Interlocking.**
  3. Thickness:
    - a. **0.063-inch-.**
- H. Leakage:
1. **Class I.**
- I. Rated pressure and velocity to exceed design airflow conditions.
- J. Mounting Sleeve: Factory-installed, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone caulking.
1. Thickness:
    - a. **18GA 0.05-inch-.**
- K. Master control panel for use in dynamic smoke-management systems.
- L. Damper Motors:
1. Locate outside air stream unless otherwise indicated,
  2. Action:
    - a. **Two-position.**
  3. Voltage: to match fire alarm system (coordinate).

4. Listed: UL, as part of damper assembly.
  5. Outdoor Motors and Motors in Outside-Air Intakes:
    - a. Gaskets: O-ring gaskets designed to make motors weatherproof.
    - b. Internal heaters: Equip to permit normal operation at minus **40 deg F**.
- M. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
1. Electrical Connection: 115 V, single phase, 60 Hz.
- N. Accessories:
1. Auxiliary switches:
    - a. **Signaling.**
    - b. **Position indication.**
  2. Test Switch type:
    - a. **Momentary test switch.**
  3. Test Switch Mounting:
    - a. **Damper.**

## 2.9 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. METALAIRE, Inc.
  2. SEMCO Incorporated.
  3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
1. Fabricate single blade vanes to comply with SMACNA's "HVAC Duct Construction Standards-Metal and Flexible."
  2. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- E. Vane Construction:
1. **Single** wall
- F. Vane Spacing:
1. 1-1/2" spacing between turning vanes

2. 3-1/4" spacing not allowed.

- G. Vane Construction: Single wall for ducts up to **36 inches** wide and additional bracing for larger dimensions.

## 2.10 REMOTE DAMPER OPERATORS

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

1. Pottorff.
2. Ruskin Company; Tomkins PLC.
3. Young Regulator Company.

- B. Cable Type:

1. Description: Cable system designed for remote manual damper adjustment.
2. Tubing/Sheathing: Galvinsed, Brass, Copper or Aluminum.
3. Cable: Stainless steel or Steel.
4. Wall-Box Mounting: Coordinate with Architect.
5. Wall-Box Cover-Plate Material: Coordinate with Architect.

- C. Activated Electric Type:

1. Description: Electrically activated zone control damper for remote adjustment. When an adjustment is needed the system is powered up.
2. Means: Factory mounted actuator factory wired to damper.
3. Portable **9 volt** system. No field power requirement.
4. Mounting: Recessed Wall Box or Diffuser or Hand Held.
5. Wall-Box Cover Finish: Coordinate with Architect.
6. Wall-Box Porting: 1 to 6 ports or more.

## 2.11 DUCT-MOUNTED ACCESS DOORS

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

1. Greenheck Fan Corporation.
2. McGill AirFlow LLC.
3. Pottorff.
4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
5. Ruskin Company

- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures **7-2**, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

- a. Double wall, rectangular.
- b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
- c. Vision panel.

- d. Hinges and Latches: **1-by-1-inch** butt or piano hinge and cam latches.
  - e. Fabricate doors airtight and suitable for duct pressure class.
- 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
  - 3. Number of Hinges and Locks:
    - a. Access Doors Less Than **12 Inches** Square: No hinges and two sash locks.
    - b. Access Doors up to **18 Inches** Square:
      - 1) Hinges:
        - a) **Two hinges and two sash locks.**
    - c. Access Doors up to **24 by 48 Inches**, provide outside and inside handles:
      - 1) Hinges:
        - a) **Three hinges and two compression latches.**
    - d. Access Doors Larger Than **24 by 48 Inches**, provide outside and inside handles:
      - 1) Hinges:
        - a) **Continuous and two compression latches with outside and inside handles.**

## 2.12 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Ductmate Industries, Inc.
  - 2. Ventfabrics, Inc.
  - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
  - 4. Duro Dyne Inc.
  - 5. Elgen Manufacturing.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a wide fabric strip attached to two narrower metal strips. Provide strips of metal compatible with connected ducts.
  - 1. Wide Strip:
    - a. **3-1/2 inches.**
  - 2. Narrow Strips:
    - a. **0.028-inch- thick, galvanized sheet steel.**
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
  - 1. Minimum Weight: **26 oz./sq. yd..**
  - 2. **Tensile Strength: 530 lbf/inch** in the warp and **440 lbf/inch** in the filling.
  - 3. Service Temperature: **Minus 40 to plus 200 deg F.**

## 2.13 FLEXIBLE DUCTS

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



1. Flexmaster U.S.A., Inc.
  2. McGill AirFlow LLC.
  3. Themaflex
  4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Ducts shall conform to the requirements for Class I connectors when tested in accordance with "Standard for Factory Made Air Ducts Materials and Air Duct Connectors" (UL 181).
- C. Ducts shall also pass the 15 minute U.L. flame penetration test as specified in the UL 181 Standard.
- D. Insulated, Flexible Duct: Two-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.
1. Pressure Rating: **10-inch wg** positive and **1.0-inch wg** negative.
  2. Maximum Air Velocity: **4000 fpm**.
  3. Temperature Range: **Minus 10 to plus 160 deg F**.
  4. Insulation R-value: **Comply with ASHRAE/IESNA 90.1**.
- E. Flexible Duct Connectors:
1. **Clamps:** in sizes **3 through 18 inches**, to suit duct size.
    - a. **Material:** Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action.

#### 2.14 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.
- C. Splitter Damper Accessories: Zinc-plated damper blade bracket; **1/4-inch**, zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.
- D. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes **3 to 18 inches** to suit duct size.

#### 2.22 HIGH EFFICIENCY TAKE-OFFS

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

1. Air-Rite
2. Hercules Industries
3. Sheet Metal Connectors, Inc.
4. Spiral Manufacturing Co. Inc.

5. Ferguson
- B. Materials:
  1. 24 gauge galvanized sheet metal meeting ASTM A653 and A924
- C. Take-off shall meet SMACNA third edition Section 4.8 figure 4.6 - 45 degree entry.
- D. Rectangular opening with flanged sides on all sides. Complete with closed cell neoprene gasket to provide a tight seal.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

##### **General**

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Use the Remote Damper Operator when they are called out on the drawings or when the damper cannot be easily accessed.
- D. Install high efficiency take-off on all branch duct take-offs. Provide take-off with balancing damper as shown on drawings. Spin-in fittings are not allowed.

##### **Flexible Ducts / Flexible Duct Connectors**

- E. Install flexible connectors to connect ducts to equipment.
- F. Flexible duct connections from the main trunk ducts to diffuser boots shall be furnished and installed as shown on the drawings. Flexible ductwork shall only be used as indicated on the drawings.
- G. Where flexible duct is indicated, use insulated flexible duct for supply air return and exhaust air.
- H. Flexible ductwork shall be run in straight lengths.
- I. Provide support in flexible duct every three feet.
- J. Flexible ducts shall have compression fittings on both ends.

- K. Flexible ductwork is not allowed to bend 90 degrees. If a bend is needed use sheet-metal hard elbows. Hard turns, offsets, or kinks will not be allowed.
- L. Flexible ducts shall connect to trunk duct with high efficiency takeoffs.
- M. Connect flexible ducts to metal ducts with **draw bands**.
- N. Connect terminal units to supply ducts:
  - 1. **With maximum 12-inch lengths of flexible duct.**
- O. Do not use flexible ducts to change directions.
- P. Connect diffusers or light troffer boots to ducts:
  - 1. **With maximum 60-inch** lengths of flexible duct clamped or strapped in place.

#### **Backdraft/Control/Pressure Relief Dampers**

- Q. **Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.**

#### **Volume Damper**

- R. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
  - 1. Install steel volume dampers in steel ducts.
  - 2. Install aluminum volume dampers in aluminum ducts.
- S. Set dampers to fully open position before testing, adjusting, and balancing. Exception: Pressure relief damper.
- T. A balance damper with locking quadrant will be provided downstream of take-off from trunk duct.

#### **Fans And Test Holes**

- U. For fans developing static pressures of **5-inch wg** and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- V. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of **1/4-inch** movement during start and stop of fans.
- W. Install duct test holes where required for testing and balancing purposes.
- X. Install test holes at fan inlets and outlets and elsewhere as indicated.

#### **FIRE, SMOKE AND FIRE-SMOKE DAMPERS**

- Y. Install fire **and smoke** dampers according to UL listing.
  - 1. Install fusible links in fire dampers.

- Z. For round ductwork **24-inch** and smaller a true round fire damper with the same rating may be used.

#### **Access Doors**

- AA. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
1. On upstream side of duct coils.
  2. **Upstream** from duct filters.
  3. At outdoor-air intakes and mixed-air plenums.
  4. At drain pans and seals.
  5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
  6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be **standard access doors** and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
  7. At each change in direction and at maximum **50-foot** spacing.
  8. **Upstream** from turning vanes.
  9. Upstream or downstream from duct silencers.
  10. Control devices requiring inspection.
  11. Elsewhere as indicated.
- BB. Install access doors with swing against duct static pressure.
- CC. Access Door Sizes:
1. One-Hand or Inspection Access: **8 by 5 inches.**
  2. Two-Hand Access: **12 by 6 inches.**
  3. Head and Hand Access: **18 by 10 inches.**
  4. Head and Shoulders Access: **21 by 14 inches.**
  5. Body Access: **25 by 14 inches.**
  6. Body plus Ladder Access: **25 by 17 inches.**
- DD. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

### 3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
1. Operate dampers to verify full range of movement.
  2. Inspect locations of access doors and verify that purpose of access door can be performed.
  3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
  4. Inspect turning vanes for proper and secure installation.
  5. Operate remote damper operators to verify full range of movement of operator and damper.

3.3 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire and smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

END OF SECTION

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**SECTION 233600 - AIR TERMINAL UNITS**

## 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. Dual-duct air terminal units.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.
  - 1. Air terminal units.
  - 2. Liners and adhesives.
  - 3. Sealants and gaskets.
  - 4. Seismic-restraint devices.
- B. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Wiring Diagrams:
    - a. For power, signal, and control wiring.
    - b. Differentiate between manufacturer-installed and field-installed wiring.
  - 3. **Hangers and supports**, including methods for duct and building attachment and vibration isolation.
- C. Delegated-Design Submittal:
  - 1. Materials, fabrication, assembly, and spacing of hangers and supports.
  - 2. **Design Calculations:** Calculations, **including analysis data signed and sealed by the qualified professional engineer responsible for their preparation** for selecting hangers and supports.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
1. Ceiling suspension assembly members.
  2. Size and location of initial access modules for acoustic tile.
  3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- B. Field quality-control reports.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Air terminal units shall withstand the effects of earthquake motions determined according to **SEI/ASCE 7**.
1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
1. Instructions for resetting minimum and maximum air volumes.
  2. Instructions for adjusting software set points.

## 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. Fan-Powered-Unit Filters: Furnish **one** spare filter for each filter installed.

## 1.8 QUALITY ASSURANCE

- A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."
- B. Product Options: Drawings and schedules indicate requirements of air terminals and are based on specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- C. Listing and Labeling: Provide electrically operated air terminals specified in this Section that are listed and labeled.
1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.



- D. NFPA Compliance: Install air terminals according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
- E. Comply with NFPA 70 for electrical components and installation.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. **Structural Performance:** Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" .

### 2.2 SYSTEM DESCRIPTION

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

### 2.3 DUAL-DUCT AIR TERMINAL UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Krueger.
  - 2. Price Industries.
  - 3. Titus.
- B. **Configuration:** Two volume dampers inside unit casing with mixing attenuator section and control components inside a protective metal shroud.
- C. **Casing: 0.034-inch steel, single** wall.
  - 1. **Casing Lining:** Adhesive attached, **coated, fibrous-glass duct liner** complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
    - a. Lining Thickness:
      - 1) **1/2-inch.**
    - b. Cover liner with nonporous foil.
  - 2. **Casing Lining:** Adhesive attached, **1/2-inch-thick, polyurethane foam insulation** complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
  - 3. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
  - 4. Air Outlet: S-slip and drive connections.
  - 5. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.

6. Access Door: Access door upstream of the reheat coil.
- D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
  1. Maximum Damper Leakage: ARI 880 rated, 3 percent of nominal airflow at:
    - a. **3-inch wg** inlet static pressure.
- E. Velocity Sensors: Multipoint array with velocity sensors in cold- and hot-deck air inlets and air outlets.
- F. Attenuator Section:
  1. Thickness/material:
    - a. **0.034-inch** steel sheet.
  2. Lining: Adhesive attached, coated, **fibrous-glass duct liner** complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
    - a. Liner thickness:
      - 1) **1/2-inch**.
    - b. Cover liner with nonporous foil.
    - c. Cover liner with nonporous foil and perforated metal.
  3. Lining: Adhesive attached, **3/4-inch-** thick, **polyurethane foam insulation** complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
- G. Electronic Controls: Bidirectional damper operator and microprocessor-based thermostat with integral airflow transducer and room sensor. Control devices shall be compatible with temperature controls specified in Section 230900 "Instrumentation and Control for HVAC" and shall have the following features:
  1. **Damper Actuator:**
    - a. **24 V, powered closed.**
  2. **Velocity Controller:** Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to **4-inch wg**; and shall have a multipoint velocity sensor. Locate velocity sensors in cold-deck air inlets and air outlets.
  3. **Thermostat:** Wall-mounted electronic type with temperature set-point display in Fahrenheit.
- H. Direct Digital Controls: Single-package unitary controller and actuator specified in Section 230900 "Instrumentation and Control for HVAC."

## 2.4 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. **Steel Cables: Galvanized steel complying with ASTM A 603.**
- D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- E. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- F. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

## 2.5 SOURCE QUALITY CONTROL

- A. Factory Tests: Test assembled air terminal units according to ARI 880.
  - 1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, and ARI certification seal.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
- B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.
- C. Install wall-mounted thermostats.
- D. Install discharge air temperature sensors at the outlet of each Air Terminal Unit.
- E. Connect ductwork to air terminals according to Division 23 ductwork Sections.
- F. Comply with SEI/ASCE 7 and with requirements for seismic-restraint devices in Section 230548 "Vibration and Seismic Controls for HVAC."
- G. For Diffuser Type Air Terminal Units, provide and install all necessary control wiring and control voltage transformer. See drawings AND schedules for additional information.

### 3.2 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  - 1. Where practical, install concrete inserts before placing concrete.
  - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes and for slabs more than **4 inches** thick.
  - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes and for slabs less than **4 inches** thick.
  - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hangers Exposed to View: Threaded rod and angle or channel supports.
- D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

### 3.3 CONNECTIONS

- A. Install piping adjacent to air terminal unit to allow service and maintenance.
- B. Hot-Water Piping: In addition to requirements in Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.
- C. Connect ducts to air terminal units according to **Section 233113 "Metal Ducts.**
- D. Electrically ground all equipment:
  - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.4 IDENTIFICATION

- A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

### 3.5 FIELD QUALITY CONTROL

- A. **Testing Agency: Owner will engage** a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

- C. Perform tests and inspections.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
  - 1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
  - 2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Air terminal unit will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
- G. Cleaning:
  - 1. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.

### 3.6 STARTUP SERVICE

- A. **Engage a factory-authorized service representative to perform** startup service.
  - 1. Complete installation and startup checks according to:
    - a. Manufacturer's written instructions.
    - b. Construction documents.
  - 2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
  - 3. Verify that controls and control enclosure are accessible.
  - 4. Verify that control connections are complete.
  - 5. Verify that nameplate and identification tag are visible.
  - 6. Verify that controls respond to inputs as specified.

### 3.7 DEMONSTRATION

- A. **Engage a factory-authorized service representative to train** Owner's maintenance personnel to adjust, operate, and maintain air terminal units:
  - 1. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
  - 2. Review data in the maintenance manuals. Refer to Division 1 Section "Contract Closeout."
  - 3. Review data in the maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."

4. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

END OF SECTION

**SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES**

## 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 ceiling- and wall-mounted diffusers, registers, and grilles.
- B. Related Sections:
  - 1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.
  - 2. Section 230594 "General Testing, Adjusting and Balancing" for balancing diffusers, registers, and grilles.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
  - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
  - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
  - 1. Ceiling suspension assembly members.
  - 2. Method of attaching hangers to building structure.
  - 3. Size and location of initial access modules for acoustical tile.
  - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
  - 5. Duct access panels.
- B. Source quality-control reports.

## 1.5 QUALITY ASSURANCE

- A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated.
- B. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Air Factors
  - 2. Carnes.
  - 3. Krueger.
  - 4. METALAIRE, Inc.
  - 5. Nailor Industries Inc.
  - 6. Price Industries.
  - 7. Titus.
  - 8. Tuttle & Bailey.
  - 9. Air Concepts.
  - 10. Trox.

## 2.2 REGISTERS, GRILLES, &amp; DIFFUSERS

- A. General: The frames for all registers, grilles, and diffusers shall match type of ceiling where they are to be installed. Special frames shall be provided for narrow T-bar ceilings. Refer to reflected ceiling plan and other specification divisions for ceiling type. See drawings AND schedules for additional information.

## 2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.



- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, coordination drawings, original design, and referenced standards.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

### 3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

### 3.4 CLEANING

- A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

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**SECTION 270000****GENERAL COMMON CONDITIONS FOR ALL  
COMMUNICATION SECTIONS****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, and other documents as designated, apply to this Document.
- B. See Division 7 and section 27 01 00 Part 3 for additional requirements.

**1.2 RELATED SECTIONS**

- A. Specifications throughout all Divisions of the Project Manual are directly applicable to this section, and this section is directly applicable to them.
  - 1. All Division 27 Sections
  - 2. Requirements of the following Division 26 sections apply to this section
    - a. Basic electrical requirements
    - b. Basic electrical materials and methods
    - c. Grounding, earthing, and bonding
  - 3. Division 21 Fire Suppression
  - 4. Division 22 Plumbing
  - 5. Division 23 HVAC
  - 6. Division 28 Electronic Safety and Security

**1.3 SUMMARY**

- A. The work on many processes in this section are not part of the Division 27 contract. The respective trades shall include their portions, and administration topics that are applicable to all Division 27 Sections in their proposals.
- B. This document is based upon the 2018 Construction Specification Institute (CSI) Master Format numbers and titles for sections within Division 27: Communications.
- C. Where IT or Owner representation is stipulated in this Division, it shall be provided by the Data Center Operations Infrastructure Cabling team.

**1.4 SUBMITTALS**

- A. Product data shall be supplied for any parts/equipment that does not match the specified part number.
- B. Shop drawings
  - 1. Labeling schedules and layouts in owner designated electronic format
  - 2. Cabling administrative drawings

**1.5 CONDITIONS**

- A. Drawings and General provisions of the contract, including Uniform General Conditions, Supplementary General Conditions, architectural plans and specifications, requirements of Division 1, electrical, mechanical, plumbing, audio visual, security and telecommunications specifications and plans apply to the communications section, and shall be consider a part of this section. The contractor shall read all sections in their

- entirety and apply them as appropriate for work in this section.
- B. Prior to beginning installation, a kick-off meeting to properly coordinate the tray installation and expectations should be held. It should be arranged by the General Contractor, and at a minimum include representatives of the following trades: FP&D, Electrical (Div. 26), Structured cable, Nurse Call, paging, building automation and control, plumbing, HVAC, fire sprinkler, framing, and others as applicable. The Data Center Operations Infrastructure Cabling Team will lead the meeting.
- C. Conflicts:
1. Drawings and specifications are to be used in conjunction with one another and to supplement one another. In general, the drawings determine the nature and quality of the installation, materials, and tests. The quantities are derived from the drawings, details, listings, and manufacturer's directions.
    - a. Final order counts and distances are the contractor's responsibility.
  2. If there is an apparent conflict between the drawings and specifications, or between specification sections, the items with the greater quality or quantity shall be submitted, estimated, and installed.
  3. Clarification with the Owner and/or Owner's Representative about these items shall be made prior to the ordering and installation.
- D. Owner / Contractor
1. The Architect/Project Manager will submit appropriate scope of work information that will allow the contractor to appropriately plan and bid the project.
- E. Contractor
1. Furnish all labor, materials, tools, equipment and services for the installation described herein. Provide add/deduct unit pricing for all components as part of the bid response. Base fixed price add/deduct units on an average cable length of 175 linear feet.
  2. The Contractor shall procure and maintain for the duration of this agreement, insurance against claims.
  3. Use of Subcontractors: Successful bidder shall inform the Owner's contact and/or General Contractor in writing about the intention to use Subcontractors and the scope of work for which they are being hired. The Owner or Owner's designated contact must approve the chosen Subcontractors in writing prior to the Subcontractor's hiring and start of any work. The low voltage Subcontractor must be approved and certified. Refer to the listing in appendix 7.
  4. Use of Subcontractors: The Contractor's designated project manager will be recognized as the single point of contact. The Project manager shall oversee all work performed to ensure compliance with specifications as outlined in bid documents (which includes all specifications and drawings) to ensure a quality installation.

## 1.6 SCOPE OF WORK:

- A. This establishes a communications infrastructure to be used as signal pathways for voice, high-speed data transmission, and other low voltage services. Contractor shall:
1. Comply with all Master Specifications documents and the following requirements for a complete project installation.
  2. Provide a structured cabling system as described hereafter that includes, but is not limited to, supplying, installing, labeling and testing of fiber backbone, fiber and voice riser cable; data copper, fiber, and voice copper horizontal cabling, cable connectors, communications outlets and terminations, patch cables, and equipment racks/cabinets for networking hardware and patch panels.
  3. All requirements and specifications will be enforced. Cable pathways and runs to individual outlets are not shown in their entirety but shall be provided as if shown in their entirety.

4. Coordinate with electrical tradespersons to verify conduit routing does not cause cabling to exceed allowable link length.
5. Follow industry standard installation procedures, including BICSI Installation Standard and guidelines as well as specified manufacturers standard recommended procedures and installation practices for communications cable to assure that the mechanical and electrical transmission characteristics of this cable plant and equipment are maintained.
6. The Division 27 work shall be performed by an approved, certified installer.
7. The low voltage communications Subcontractor shall complete non-concealed work.

#### 1.7 REFERENCE STANDARDS:

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of the Contract shall be applicable to this Project.
- C. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.
- D. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean reference to the latest printed edition of each in effect at the date of contract.
- E. Codes and Standards (Most recent editions with addenda/TSB, etc.) All materials, installation and workmanship shall meet or exceed the applicable requirements and standards addressed within the references listed in **Appendix 04**.

#### 1.8 DEFINITIONS:

- A. Definitions and Abbreviations are listed in **Appendix 05**:

### PART 2 - PRODUCTS

#### 2.1 PRODUCTS AND WORK NOT included BY DIVISION 27

- A. Others shall separately purchase and/or provide certain equipment and miscellaneous items that will be installed during the installation process. Such items may not be indicated in the documents. Contractor shall coordinate with the Owner and his suppliers when considering:
  1. Provision and installation of phone systems, computer hardware, and related networking software and equipment.
  2. Provision and installation of multi-port routers, hubs in communications rooms.
    - a. TEC/TDR UPS's are owner provided.
  3. Communications grounding bus bars and grounding wires connecting to the main building electrode system by Division 26.
  4. Dedicated power panels, ground bus bars, circuits and utility outlets.
  5. Installation and finishing of fire-rated plywood backboards.
  6. Building mechanical ductwork, cooling/heating system, and environmental control sensors.
  7. Communication pathway devices such as, conduits, conduit sleeves, back boxes, and penetrations in walls and floors. Including, but not limited to concealed work, office spaces and open areas.
  8. Provision and installation of modular furniture and millwork.

### PART 3 - PENETRATIONS

3.1 THE WORK IN THIS SECTION IS IN DIVISION 7 CONTRACT; AND VERIFIED COMPLETE AT PROJECT TURNOVER.

- A. Wall Penetrations - Fire - Smoke – Sound
1. All fire, smoke, and sound wall penetrations must be correctly made to protect the safety of patients and employees. A facility is designed/architected and built with fire integrity that must not be lost as the building is modified over its lifetime.
  2. The items listed often penetrate 1 – and 2 – hour fire-resistance-rated (FRR) assemblies. General requirements for filling the space between the item in question and the wall are found in NFPC 101® Section 8.2.3.2.4.2. There is the option to either fill the space with appropriately rated fire-stop material or protect the space with an approved device designed to maintain the fire resistance of the wall.
  3. If a sleeve is used around the item that transverses the wall, the sleeve must be installed into the wall without any opening between the sleeve and the wall. The open space within the sleeve must then be filled with appropriately rated fire stop.
- B. All items listed in 1 through 2 must have penetrations in fire-resistance-rated assemblies filled to maintain the integrity of the fire barrier.
1. Conduits
    - a. When conduit passes through a wall that is either rated or must be fire-stopped due to lack of sprinklers in the compartment, it is essential to fill any gap around the conduit as described above.
  2. Cables/Wires
    - a. Sometimes cables or wires are passed through a penetration contained in a fire wall as a single installation. This often happens in a health care organization with communication cables. Even in these cases, the penetration must be patched appropriately.
  3. NOTE: Fire, smoke, and sound wall penetrations are also governed by local and state building codes.
  4. NOTE: This requirement applies to all departments, organizations, employees, and/or vendors who perform structured cable work in the facilities for:
    - a. Telephony and Computer networks, fire, smoke, and sound wall penetrations, alarm systems, security systems, HVAC Control or sensors, patient entertainment systems, announcing systems, nurse call, telemetry, RFID, etc.
  5. NOTE: While this document is written specifically for low voltage wiring, the JCAHO standards apply for any fire or smoke wall penetration. As you perform work in the facility, if you note any existing penetrations that are not up to standard, please notify the construction Project Manager immediately.
  6. While Facility Engineering has the overall responsibility, each department, organization, employee, and/or vendor has the responsibility to follow the process in obtaining a permit from facility engineering before work is started and to follow the guidelines to maintain the fire/smoke wall integrity.
- C. Process:
1. NOTE: This process applies to any person, group, and/or vendor who perform low voltage cable installations at any Intermountain facility or clinic.
    - a. Fire/Smoke Walls
      - 1) Any Vendor, department, and/or person needing to do any cable work that involves wall penetrations, adding to existing or new, are required to obtain a “Low Voltage Cable Work Permit” from Facility Engineer.
    - b. Above Ceiling Work
      - 1) Any vendor, department, and/or person needing to do any cable work above ceiling tiles, adding to existing or new, are required

to obtain all required permits.

- c. Above Ceiling Permit to be obtained from Facilities Management
  - 1) The permit requires detail information as to what work is being done, where the work will be done. The permit will also state the current approved sealing compound for the facility and specific requirements for conduits etc.
  - 2) There may also be specific rules regarding how work may be conducted in certain areas of the hospital. NOTE: Different manufacture's sealing products can NOT be used in the same penetration. Therefore, if an additional cable is added to an existing penetration, and you don't have the same brand of caulk, you must remove all of the caulk and re-do the seal completely.
- d. ICRA Permit to be obtain from Infectious Preventionist
- e. Hot Work Permit to be obtain from Facilities Engineer
- 2. Quality of Work
  - a. Facility Engineering Orientation

### 3.2 MEASUREMENT PROCEDURES:

- A. The Contractor shall
  - 1. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.
  - 2. Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements and scale on shop drawings.
  - 3. Coordinate fabrication schedule with construction progress to avoid delaying the work.
  - 4. Where field measurements cannot be made without delaying the work, establish dimensions and coordinate with the General Contractor.
  - 5. When approved, proceed with fabricating units without field measurements.

### 3.3 CHANGES

- A. ALTERNATES:
  - 1. If an alternate material is proposed that is equal to or exceeds specified requirements, Contractor shall provide manufacturers' specifications in writing for Owner approval prior to purchase and installation.
  - 2. Substitutions of material by the Contractor shall be in writing complete with written manufacturers' specifications. The material substituted shall not void, alter or change manufacturers' structured cabling system warranty.
  - 3. Contractor shall:
    - a. Provide a complete cabling infrastructure according to these written specifications and drawings. If the Owner changes the scope of work to be performed by the Contractor, it shall be in writing.
    - b. Promptly respond to these changes with a complete material list, including pricing, and labor in writing presented to the Owner for approval. Also include unit pricing.
    - c. Do not proceed with any additional scope of work without a signed approval by the Owner.
  - 4. Owner will not pay for additional work performed by the Contractor without signed approval of these changes. Contractor will submit a copy of signed change order upon billing.
  - 5. The Owner's Infrastructure Cable team will be the final judge of acceptability, with review by Owner's Representative and the distribution of the acceptance by the Architect. No substitute shall be ordered, installed or utilized without the

Architect's prior written verification of acceptance from the Owner's Infrastructure Cable team.

**B. SUBSTITUTION PROCEDURES**

1. Substitution may be considered when a product becomes unavailable through no fault of the Contractor.
2. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Include in each request for substitution:
  - a. Product identification, manufacturer's name and address.
  - b. Product Data: Description, performance and test data, reference standards, finishes and colors.
  - c. Samples: Finishes
  - d. Complete and accurate drawings indicating construction revisions required (if any) to accommodate substitutions.
  - e. Data relating to changes required in construction schedule.
  - f. Cost comparison between specified and proposed substitution.
3. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
4. The Owner will be the final judge of acceptability, with review by Owner's Representative and the distribution of the acceptance by the Architect.
5. No substitute shall be ordered, installed or utilized without the Architect's prior written verification of acceptance from the Owner's Infrastructure Cable team.

**PART 4 - EXECUTION****4.1 QUALITY ASSURANCE****A. Regulatory Requirements:**

1. Contractor shall supply all city, county, and state telecommunication cabling permits required by appropriate governing agency.
2. Prior to commencing work, the Contractor and staff shall secure all required Intermountain Healthcare permits including, but not limited to; facility sign in, ceiling work permits, hot work permits, and confined space permits.
3. Contractor shall be city, county, and state-licensed and/or bonded as required for communications/low voltage cabling systems work.

**B. Certifications:**

1. Contractor shall submit an up-to-date and valid certification verifying qualifications of the Contractor and installers to perform the work specified herein at time of bid submission.
2. Contractor shall have a complete working knowledge of low voltage cabling applications such as, but not limited to data, voice and video network systems.
3. Contracting firm shall have installed similar-sized systems in at least ten (10) other projects in the last five years prior to this bid and be regularly engaged in the business of installation of the types of systems specified in this document. Certification shall include, but not be limited to, items such as name and location of project contacts and numbers, total square footage, total number of cables/drops, types of media, etc.
4. Contractor shall provide certificates for the appropriate insurance coverage as defined in contract documents.
5. All installer personnel that will be assigned to this project shall be listed in a qualification document. 50% of the personnel working on the job site shall have a minimum of 3 years' experience in the installation of the types of systems, equipment, and cables specified in this document. Any personnel substitutions shall be noted in writing to Owner's Data Center Operations Infrastructure

Cabling representative prior to commencement of work.

6. BICSI ITS Cabling Installation Program Installer Level 1 or 2 or Technician certifications may be substituted in lieu of the 3-year requirement. All cabling



installers shall be trained and certified by the cable manufacturer for communication cabling installations and maintenance of said materials.

7. Refer also to General Conditions.

C. Administrative Requirements and Coordination:

1. The Contractor shall:

- a. Ensure that all technicians performing work have obtain badge access 48 hours prior to scheduled start.
- b. Provide a specified contact person (name and contact number) for coordination to attend project meetings with the communication consultant, the Owner and others.
- c. Coordinate work of this section with Owner's system specifications, workstations, equipment suppliers, and installers.
- d. Coordinate installation work with other crafts (examples include ceiling grid contractors, HVAC and sheet metal contractors, etc.) under the direction of the General Contractor to resolve procedures and installation placement for cable trays and cable bundle pathways. The goal of this coordination will be to establish priority pathways for critical data/voice network cable infrastructure, materials, associated hardware, as well as mitigate delays to the project and to allow service access for communications and HVAC components. Damage by Contractor to the craftwork of others will be remediated at the Contractor's expense in a timely manner.
- e. Exchange information and agree on details of equipment arrangements and installation interfaces. Record agreements reached in meetings and distribute record to other participants, Owner and communication consultant.
- f. Arrangement, layout, and locations of distribution frames, patch panels, and cross-connect blocks in equipment rooms and racks to accommodate and optimize arrangement and space requirements of any service provider equipment, telephone system, and LAN equipment as directed by Data Center Operations. Tasks shall be coordinated with the Owner's Data Center Operations team, and other trades' installation representatives.
- g. Where installed, confirm exact locations and method of mounting outlets in modular furniture. Follow furniture manufacturers' written instructions for installing cable and devices in modular partitions. Obtain modular furniture and power pole locations from the General Contractor. Wiring locations noted in plans along walls for modular furniture are approximate and will have to be determined by Contractor at time of installation. Field condition adjustments for installation may have to be made and coordination efforts with the mechanical and electrical contractor for pathway must take place early in the project to comply with maximum 40% conduit fill factor requirements.
- h. When requested by Owner or Owner's representative, furnish extra materials that match specified products and that are factory packaged with protective covering for storage and identified with labels describing contents. Unit pricing shall apply.

D. Contract Administration:

1. Change orders shall be submitted to the Owner/Project Manager complete with price breakdown and description for approval before any work is done.
2. Owner's Data Center Operations Representative will provide job field reports upon inspection of Contractor's installation, materials, supporting hardware, coordination with other trades and progress to schedule to the Owner's project manager.
3. Job Field Report outline:

- a. General installation progress in relation to scheduled work made by the Contractor up to that date.
  - b. All deficiencies noted in the cable installation to be corrected by the Contractor.
- E. Pre-Installation Meetings - Contractor shall:
1. Attend and/or arrange a scheduled pre-installation conference prior to beginning any work of this section.
    - a. Agenda: This venue is to ask and clarify questions in writing related to work to be performed, scheduling, coordination, etc. with consultant and/or project manager/and Data Center Operations Infrastructure Cabling representative.
    - b. Attendance: Communications project manager/supervisor shall attend meetings arranged by General Contractor, Owner's Data Center Operations Infrastructure Cabling representatives, and other parties affected by work of this document.
    - c. All individuals who will be installers of communication cables and equipment in an on-site supervisory capacity shall be required to attend the pre-installation conference. Individuals who do not attend the conference will not be permitted to supervise the installation of, or install, terminate, or test communications cables on the project. This includes supervisors, project managers, and lead installers of this project.
- F. Request for Change (RFC)
1. A Request for Change shall be opened and approved by the Change Approval Board prior to any modifications, attachments, or other activities that may affect production systems.
    - a. Policy and details available through the Data Center Operations Infrastructure Cable Representative.
- G. Post-Installation Meetings:
1. Schedule Div. 27 Final Inspection
  2. At the time of substantial completion, or shortly thereafter, the low voltage Sub-Contractor shall call and arrange for a post-installation meeting to present and review all submittal documents to include, but not limited to as-built drawings, test reports, warranty documentation, etc. Attendees shall be Owner staff, Owner's Representative, General Contractor, and others that the General Contractor deems appropriate.
  3. At this meeting the Contractor shall present and explain all documentation, including test results, and ask for feedback on its completeness. Any discrepancies or deviations noted by and agreed to by participants shall be remedied by Contractor and resubmitted within one week of meeting.

#### 4.2 DELIVERY, STORAGE, AND HANDLING:

- A. Coordination with delivery companies, drivers, site address, and contact person(s) will be the responsibility of the Contractor.
- B. Contractor Shall:
  1. Be responsible for prompt material deliveries to meet contracted completion date.
  2. Coordinate deliveries and submittals with the General Contractor to ensure a timely installation.
  3. No equipment materials shall be delivered to the job site more than three weeks prior to the commencement of its installation.
  4. Equipment shall be delivered in original packages with labels intact and identification clearly marked.
  5. Materials shall not be damaged in any way and shall comply with manufacturer's operating specifications.

6. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants. Equipment damaged prior to system acceptance shall be replaced at no cost to the Owner.
  7. Material Contractor shall be responsible for all handling and control of equipment.
  8. Material Contractor is liable for any material loss due to delivery and storage problems.
- C. Owner/General Contractor shall supply a list of security requirements for Contractor to follow.

#### 4.3 PROJECT/SITE CONDITIONS

- A. For all environmental recommendations, refer to master Architectural section.
- B. For all security recommendations, refer to related Division 01.
- C. After completing system installation, including outlet fittings and devices, inspect exposed finish. Contractor will remove burrs, dirt, and construction debris. If applicable, the Contractor will repair damaged finishes, including chips, scratches, and abrasions.
- D. Contractor shall provide daily a clean work environment, free from trash/rubbish accumulated during and after cabling installation.
- E. Food and drink are not permitted in work areas. They shall be stored, prepared, and consumed only in designated break or cafeteria areas.
- F. Contractor shall keep all liquids (drinks, sodas, etc.) off finished floors, carpets, and tiles. If any liquid or other detriment (cuts, soils, stains, etc.) damages the above finishes, Contractor shall provide professional services to clean or repair scratched/soiled finishes, at Contractor's expense.

#### 4.4 CLEANING

- A. Work areas will be kept in a broom clean condition throughout the duration of the installation process.
- B. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where work has been performed daily, unless designated for storage.
- C. The Contractor will damp clean all surfaces prior to final acceptance by Owner.

END OF SECTION

## SECTION 270100

OPERATION AND MAINTENANCE OF  
COMMUNICATIONS SYSTEMS

## PART 1 - GENERAL

## 1.1 INTRODUCTION

- A. To make the approval of such a large topic possible, the structured cable topic has been broken into its subcomponents and each subcomponent was completed, reviewed, and approved in turn. The result is this comprehensive guideline that should provide adequate guidance on this topic.

## PART 2 - PRODUCT

## 2.1 KEY POINTS

- A. Category 6A shielded foil over unshielded twisted pair (F/UTP) is the only approved standard for cabling.
  - 1. Specifically, Siemon category CAT6A F/UTP (foil over unshielded twisted pair) cable and associated patch panels, wall plates and jacks; for data centers, and all clinical and hospital campus'.
  - 2. Only Siemon certified contractors or certified Intermountain Healthcare cable technicians will install structured cable at Intermountain Healthcare facilities.

## 2.2 IMPLEMENTATION

- A. This guide is to be used for New Construction and Remodels. These standards will be implemented over time in existing cabling environments as rework is performed.
- B. If there is a current need to connect servers at 10GBaseT and the only option is copper, CAT6A F/UTP is required. New Server connections shall be a minimum OS1 Single Mode Fiber.
- C. Installations already in place are not required to remove or replace existing cabling CAT5e or newer. All new cabling shall follow the recommendation to use CAT6A F/UTP cabling.

## 2.3 STANDARD PRODUCT

- A. The Approved cable type for horizontal cabling is CAT 6A F/UTP.
  - 1. The Approved Standard Manufacturer for Intermountain Healthcare's horizontal cabling is:
    - a. **Siemon Company USA**  
101 Siemon Company Drive  
Watertown, CT 06795
  - 2. Approved Suppliers of Siemon cable, patch panels, jacks, and parts are listed in Appendix 06:

## PART 3 - EXECUTION

## 3.1 Horizontal Cabling

- A. Horizontal Subsystem is the portion of the cabling system that extends from (and includes) the work area telecommunications outlet/connector to the Floor Distributor (FD)/Horizontal Cross-connect (HC) in the telecommunications room (TDR). It consists of the communications outlet/connector, the horizontal cable, optional consolidation point,

and that portion of the cross-connect in the telecommunications room serving the horizontal cable. Each floor of a building should be served by its own Floor Distributor/Horizontal (FD/HC) Subsystem located in the telecommunications Room (TDR).

1. NOTE: Cable installers have rigorous requirements to be certified for Siemon cables and products. Validation of certification is required prior to accepting a bid.
  2. Current Siemon Approved/Certified Cable Installers for Siemon Network are listed in Appendix 07.
- B. Reliability of the horizontal cabling system is critical to the operation of IS equipment throughout a facility. Installing the cable is extremely labor intensive and there are several learned skills used to correctly install the cable. Cable installers are certified, and installers must demonstrate the ability to install the cable correctly to be certified. If the cable is installed by a certified installer and is installed in accordance with the manufacturer's guidelines, the manufacturer will warranty the cable installation.
- C. The manufacturer also requires the cables to be individually labeled and 100% tested and certified. Cable testing and certification equipment is usually expensive and is not commonly available at the facility or by many telecom installers. Certified Installer companies are required by the manufacturer to be knowledgeable in the use of "Qualified" Field Testing equipment and provide test results for warranty registration.
1. Contractor is to verify with the manufacturer the current "Qualified" tester manufacturers and the current operating software.
  2. Contractors will provide test results in the operating software format (not PDF, text or Word) to Intermountain Healthcare upon completion.
- D. Much of the cable is installed in walls and in the ceiling and usually lasts the lifespan of the building. As with most technology, the lifespan of cable is its usability and applicability to its use on future computing technology.

END OF SECTION

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**SECTION 270113****WARRANTY, PRODUCT AND SYSTEM****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them, including but not limited to the listing found in Section 27 00 00.

**PART 2 - PRODUCTS****2.1 STANDARD WARRANTY**

- A. Contractor shall provide a minimum one (1) year warranty on installation and workmanship PLUS an Extended Product Warranty and System Assurance Warranty for this wiring system and shall commit to make available local support for the product and system during the Warranty period.
- B. System Certification: Upon successful completion of the installation and subsequent inspection, the customer shall be provided with a Manufacture Warranty certificate.
- C. Either a permanent link or channel model configuration may be applied to the horizontal and/or backbone sub-systems of the structured cabling system. Applications assurance is only applied to a channel model configuration. All channels are to be qualified for linear transmission performance up to 500 MHz to ensure that high-frequency voltage phase and magnitude contributions do not prove cumulative or adversely affect channel performance.

**2.2 EXTENDED WARRANTY**

- A. The manufacturer of passive telecommunications equipment used in a manner not associated with the Systems Warranty must have a minimum five (5) year Component Warranty on all its product. The Products Warranty covers the components against defects in material or workmanship under normal and proper use.
  - 1. Special Project Warranty: A full end-to-end written warranty mutually executed by manufacturer and the principal Installer, agreeing to replace and install voice/data distribution system components that fail in materials or workmanship, or do not meet manufacturer's official published specifications and performance criteria within the special Project warranty period specified below. This shall cover applications assurance, cable, and connecting hardware including both labor and materials. This warranty shall be in addition to, and not a limitation of, other rights and remedies the Owner may have against the Contractor under the Contract Documents.
- B. A twenty (20) year warranty available for the Category 6A Z-MAX copper structured cabling system shall be provided for an end-to-end channel model installation which covers applications assurance, cable, connecting hardware and the labor cost for the repair or replacement thereof. The fiber warranty will be an XGLO twenty (20) year warranty, which is based on using laser optimized single mode fiber as minimum.
  - 1. Performance claims based on worst case testing and channel configurations.

2. Special Project Warranty Period: 20 years minimum, beginning on the date of Substantial Completion.
3. Siemon Certified Warranty Requirements:
  - a. Upon Completion of the project, Intermountain Healthcare must receive the Full Warranty Documentation from The Siemon Company before final retention funds are released to the general contractor, electrical contractor and structured cabling subcontractor if applicable.

### 2.3 MAINTENANCE

- A. Support Availability: The Contractor shall commit to make available local support for the product and system during the Warranty or Extended Warranty period.

END OF SECTION

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**SECTION 270119****FIELD TESTING AND REPORTING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them, including but not limited to the listing found in Section 27 00 00.

**1.2 SYSTEM DESCRIPTION**

- A. Owner reserves the right to be present during any or all testing.
- B. The objective of this project is to provide a complete communications cabling infrastructure system installation including, but not limited to: fiber backbone, riser system, horizontal data and voice cabling with associated terminations, mounting equipment, cable pathway and management systems, testing and other items/materials, as specified in drawings, these specifications, and contract documents.
- C. The Contractor's BICSI Registered Communications Distribution Designer (RCDD) supervisor shall review, approve and stamp all documents prior to submitting. The Contractor's RCDD shall warrant in writing that 100% of the installation meets the requirements specified herein upon completion of all work.
- D. Product Certificates shall be signed by manufacturers of cables, connectors, and terminal equipment certifying that products furnished comply with requirements.
- E. Contractor shall submit the required Field Test Reports in the format and media specified, upon completion of testing the installed system.
- F. Contractor shall deliver manufacturer's signed long-term Warranty of installed cabling system to include all components that comprise the complete cabling system. Delivery to be affected within two weeks of the time of final punch list review. Failure of any component to pass system component tests shall be promptly corrected, repaired or replaced to meet standards compliance.

**1.3 PREFERRED OWNER INSPECTION & TEST CHECKPOINTS**

- A. DCO & ICT Inspection Milestones & Responsibilities need to be coordinated into master project plan to allow the GC to make timely arrangements. All are per floor and/or phase.
  - 1. ICT & DCO = Framing, during and/or after boxes & conduits are in place; prior to sheetrock.
  - 2. ICT = When cable basket is starting to be installed.
  - 3. ICT = When cable basket is ready, but prior to starting to pull cable.
  - 4. ICT & DCO = When TDR's are ready for racks and ladders.
  - 5. DCO = When anchoring racks and laying out equipment.
  - 6. ICT & DCO = When TDR environmental requirements are ready, room is dust free, and securable.
    - a. The TEC and TDRs must be high on the build timeline and be completed early in the construction to accommodate the building systems to be tested and commissioned, such as BAS, Security, and Wireless Network.
  - 7. ICT = When trim and testing are in progress.
  - 8. OTHERS
    - a. Depending on project, the manufacturer will inspect 1 or 2 times.
    - b. DCO or ICT = When problems or questions arise.



## PART 2 - PRODUCTS

### 2.1 SITE TESTS & INSPECTIONS

- A. Prior to pulling cable, the cabling contractor shall schedule an inspection of the pathways with a member of the Data Center Operations Infrastructure cabling team.
- B. Upon completion of the communications infrastructure systems, including all pathways and grounding, the Contractor shall test the system.
  - 1. Cables and termination modules shall be affixed, mounted or installed to the designed/specified permanent location prior to testing.
  - 2. Any removal and reinstallation of any component in a circuit, including faceplates, shall require retesting of that circuit and any other disturbed or affected circuits.
  - 3. Approved instruments, apparatus, services, and qualified personnel shall be utilized.
  - 4. If tests fail, Contractor shall correct as required to produce a legitimate passing test.
  - 5. Manipulation of tester parameters on a failing test in order to achieve a passing test is unacceptable.
- C. These specifications will be strictly enforced. The Contractor must verify that the requirements of the specifications are fully met through testing with an approved tester (rated for testing the cable type in use), and documentation as specified below. This includes confirmation of requirements by demonstration, testing and inspection. Demonstration shall be provided at final walk-through in soft copy.
- D. Notification of the likelihood of a cable exceeding standardized lengths must be made prior to installation of the cable. Without contractor's prior written notice and written approval by the Owner, testing that shows some or all pairs of cable not meeting specifications, shall be replaced at Contractor's expense (including respective connectors).
- E. Testing is still required for non-compliant cabling. The tests shall be for wire-mapping, opens, cable-pair shorts, and shorts-to-ground. The test results must be within acceptable tolerances and shall be submitted with the Owner's acceptance document.

### 2.2 CABLE TESTING PLAN

- A. The Contractor shall:
  - 1. Provide a complete and detailed test plan for approval of the cabling system specified herein, including a complete list of test equipment for copper and fiber optic components and accessories prior to beginning cable testing. The following minimal items shall be submitted for review:
    - a. All testing methods that clearly describes procedures and methods.
    - b. Product data for test equipment
    - c. Certifications and qualifications of all persons conducting the testing.
    - d. Calibration certificates indicating that equipment calibration meets National Institute of Standards and Technology (NIST) standards and has been calibrated at least once in the previous year of the testing date.
  - 2. Include validation, and testing. Owner will require that the telecommunications cabling system installed by the Contractor be fully certified to meet all necessary requirements to be compliant with referenced IEEE and TIA specifications and vendor's warranty.
  - 3. Will determine the source/cause of test failure readings and correct malfunctioning component and/or workmanship within each channel or permanent link and retest to demonstrate compliance until corrected failure produces a passing result.

### 2.3 CABLE TESTING REPORTS

- A. The Contractor shall submit cable test reports as follows:
  - 1. Submit certified test reports of Contractor-performed tests.
    - a. The tests shall clearly demonstrate that the media and its components fully comply with the requirements specified herein.
    - b. (1) set of electronic test reports shall be submitted and clearly identified with cable identification.

## PART 3 - EXECUTION

### 3.1 TEST EQUIPMENT

- A. All transmission testing of balanced twisted-pair cables shall be performed with an approved Level III balance twisted pair tester found on the Siemon Ally Website. The latest version of software shall be installed prior to performing testing. Refer to the Siemon Warranty Documents for proper testing requirements of associated cable and components.
- B. All balanced twisted-pair field testers shall be factory calibrated each calendar year by the field test equipment manufacturer as stipulated by the manuals provided with the field test unit. The calibration certificate shall be provided for review prior to the start of testing
- C. Auto test settings provided in the field tester for testing the installed cabling shall be set to the default parameters
- D. Test settings selected from options provided in the field testers shall be compatible with the installed cable under test.

### 3.2 TEST METHOD / CRITERIA

- A. Copper Testing
  - 1. Testing of all newly installed cable channels shall be performed prior to system cutover.
    - a. Visually inspect F/UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments and inspect cabling connections for compliance with TIA/EIA-568-C.1.
    - b. Visually confirm Category 6A marking of outlets, cover plates, outlet/connectors, and patch panels.
    - c. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
    - d. Test F/UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
    - e. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C, and those required by manufacturer to validate and start warranty.
  - 2. Copper Testing all 500 MHz category 6A field-testing shall be performed with an approved level 111e balanced twisted-pair field test device, that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex (Level IIe or IIIe balanced twisted pair field test device). Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
  - 3. All installed 500 MHz category 6A channels shall perform equal to or better than the minimum requirements as specified below:
    - a. Category 3, balanced twisted-pair backbone cables, for the channel shall be 100 percent tested according to ANSI/TIA/EIA-568-C.1. Test parameters include wire map plus F/UTP (ScTP) shield continuity (when

present), insertion loss, length and NEXT loss (pair-to-pair). NEXT testing shall be done in both directions.

- b. 500 MHZ Category 6A balanced twisted-pair horizontal and backbone cables, shall be 100 percent tested.
- 4. F/UTP Performance Tests
  - a. Wire map.
  - b. Length (physical vs. electrical, and length requirements)
  - c. Insertion loss
  - d. Near-end crosstalk (NEXT) loss
  - e. Power sum near-end crosstalk (PSNEXT) loss
  - f. Equal-level far-end crosstalk (ELFEXT)
  - g. Power sum equal-level far-end crosstalk (PSELFEXT)
  - h. Return loss
  - i. Propagation delay
  - j. Delay skew
  - k. F/UTP Shield continuity
- 5. Final Verification Tests: Perform verification tests for F/UTP systems after the complete communications cabling and workstation outlet/connectors are installed.
- 6. Document data for each measurement. Data for submittals shall be printed in a summary report.
- 7. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- 8. Prepare and submit test and inspection reports.
- B. Horizontal Fiber Testing
  - 1. Fiber horizontal cables shall be 100% tested for insertion loss and length.
  - 2. Insertion loss shall be tested at 850 nm or 1300 nm for 50/125 $\mu$ m and 62.5/125 $\mu$ m multimode cabling in at least one direction using the Method B (1-jumper) test procedure as specified in ANSI/TIA/EIA-526-14A.
  - 3. Length shall be tested using an OTDR, optical length test measurement device or sequential cable measurement markings.
  - 4. The horizontal link performance guarantees are based on an optical fiber calculation for the appropriate fiber solution. Optical fiber calculations shall be determined using the Siemon Fiber Loss Calculator found on the Siemon Ally Website.
- C. Backbone Fiber Testing
  - 1. Fiber backbone cables shall be 100% tested for insertion loss.
  - 2. Insertion loss shall be tested at both 850 nm and 1300 nm for 50/125 $\mu$ m and 62.5/125 $\mu$ m multimode cabling and both 1310 nm and 1550 nm for 8.5/125 $\mu$ m single mode cabling and in at least one direction using the Method B (1-jumper) test procedure as specified in ANSI/TIA/EIA-526-14A.
  - 3. Insertion loss shall be tested at 1310 and 1550 for single-mode cabling in at least one direction using the Method A.1 (1-jumper) test procedure as specified in ANSI/TIA/EIA-526-7.
  - 4. Length shall be tested using an OTDR, optical length test measurement device or sequential cable measurement markings.
  - 5. The backbone link performance guarantees are based on an optical fiber calculation for the appropriate fiber solution. Optical fiber calculations for any fiber cable greater than 90m (295 ft.) shall be determined using the Siemon Fiber Loss Calculator found on the Siemon Ally Website.

### 3.3 DEMONSTRATION

- A. Include training for appropriate IT staff in numbering system and documentation system methods and record keeping. Proper fiber terminations and fiber jumper installations.

END OF SECTION

## SECTION 270143

QUALIFICATIONS AND REQUIRED TRAINING  
FOR CONTRACTORS AND INSTALLERS

## PART 1 - GENERAL INSTALLER QUALIFICATIONS

## 1.1 ENTITIES

- A. Communications contractors
1. The Communications Contractor shall at a minimum possess the following qualifications:
    - a. Contractor shall be a Siemon Certified Contractor with valid up to date contract certification and in good standing with the Siemon Company.
    - b. Be in business a minimum of five (5) years.
    - c. Contractor shall demonstrate satisfaction of sound financial condition and can be adequately bonded and insured if the project deems necessary.
    - d. Possess those licenses/permits required to perform telecommunications installations in the specified jurisdiction.
    - e. Use personnel knowledgeable in local, state, province and national codes and regulations. All work shall comply with the latest revision of the codes or regulations. When conflict exists between local or national codes or regulations, the most stringent codes or regulations shall be followed.
  2. Contractor must possess current liability and workers compensation insurance certificates.
  3. Contractor must be registered with BICSI and have at least one RCDD on staff or ITS Cabling Installer Program Technician certification and Installer Level 1 & 2 for a minimum of 75 percent of staff.

## 1.2 TRAINING

- A. The Contractor shall be fully conversant and capable in the cabling of low voltage applications such as, but not limited to data, voice and imaging network systems. The Contractor shall at a minimum possess the following qualifications:
1. Personnel trained and certified in the design of the Siemon Cabling System®.
  2. Personnel trained and certified to install the Siemon Cabling System®.
  3. The Designer and Installer shall show proof of current certification of the Siemon Cabling System® via an updated certificate given after attending the Certified Installer training course or an on-line re-certification class given every two years.
  4. Provide references of the type of installation provided in this specification.
  5. Personnel trained and certified in the installation of copper cable and in the use of Level IIIe Copper Transmission Performance testers, fiber optic cabling, splicing, termination and testing techniques. Personnel must have experience using an optical light source and power meter plus an OTDR.
  6. Personnel trained in the installation of pathways and supports for housing horizontal and backbone cabling.
- B. Facilities Orientation

END OF SECTION

## SECTION 270171

RESPONSIBILITY AND WORKMANSHIP  
OF CONTRACTOR

## PART 1 - GENERAL

## 1.1 CONTRACTOR RESPONSIBILITY

- A. Contractor shall be obligated to exercise the highest standard of care in performing its obligations as defined in a request for proposal. All work shall be done in a workman like fashion of the highest standards in the telecommunications industry.
- B. All equipment and materials are to be installed in a neat and secure manner, while cables are to be properly dressed in accordance with standards recommendation for a specific type of media (i.e. UTP vs. F/UTP @ 10 Gigabit)
- C. Workers must clean any debris and trash at the close of each job and workday.
- D. Contractor acknowledges that Intermountain Healthcare will rely on contractor's expertise, ability and knowledge of the system being proposed and shall be obligated to exercise the highest standard of care in performing contractual obligation as defined in the Scope of Work.
- E. Contractor must submit The Siemon warranty, Cable Records, As Built Drawings and Test Results at the completion of work. Note: Intermountain Healthcare reserves the right to withhold final payments until all registration documents are approved by the Siemon Company and received by Intermountain Healthcare.

## 1.2 CONTRACTOR AND EMPLOYEE RESPONSIBILITY

- A. Contractors, their employees, and installers will attend annually Intermountain Healthcare required Infection Control training.
- B. Contractors, their employees, and installers will complete Reprax registration.
- C. Contractors, their employees, and installers will attend Intermountain Healthcare required site and job specific orientation.
- D. Contractors, their employees, and installers will maintain Intermountain Healthcare required immunizations.
- E. Contractors, their employees, and installers will keep their Intermountain Healthcare required confidentiality agreements current.
- F. Contractors, their employees, and installers always agree to follow all Intermountain Healthcare Policies and procedures and wear the appropriate ID while on any of Intermountain properties.
- G. Contractor will determine with Owner the appropriate level of Environmental Containment precautions to utilize for each work location. Infection Control Risk Assessments and permits will be performed as required.
- H. Upon request, provide qualification data for all qualified layout technicians, installation supervisors, and field inspector
  - 1. Siemon issued qualification badges shall be readily available for this purpose.

## 1.3 EXAMINATION

- A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
- B. Established Dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating units without field

measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

#### 1.4 PREPARATION

- A. Pre-installation inspection
  - 1. The Contractor shall visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport. Visibly damaged goods are not acceptable and shall be replaced by the contractor at no additional cost to the Owner.

#### 1.5 MISCELLANEOUS CONTRACTOR RESPONSIBILITIES

- A. Contractor will maintain unobstructed egress in work areas.
- B. Contractor will keep an access for all Emergency Services.
- C. Contractor will maintain training for Personnel in alternate exits if needed.
- D. Contractor will maintain Temporary construction partitions, as required, that are smoke tight and built of non-combustible materials.
- E. Additional Fire Extinguishers may be required and will be properly maintained and inspected.
- F. Construction site will be maintained clean and orderly.
- G. Contractor will observe Intermountain Healthcare's Tobacco Use Policy. (All forms of tobacco use are strictly prohibited)
- H. All Electrical Extension cords will be grounded, and in good condition and, plugged into approved GFI Receptacles.
- I. Construction site will be restricted. (Approved personnel Only)
- J. Required Personal Protective Equipment (PPE) will be worn as required. (i.e. hard hats, safety glasses, safety shoes, fluorescent vest, in accordance with general contractor's safety policy)
- K. Tools will be unplugged, and power secured at the end of each working day.
- L. All employees and contractors will understand how to obtain MSDS sheets.
- M. Contractor will notify proper personnel of any fire system shut down. A 48-hour notification is required.
- N. Contractor will address all vibration concerns with Intermountain Healthcare and general contractor's staff.
- O. Contractor will address all Noise Issues with Intermountain Healthcare and general contractor's staff.
- P. Contractor will fill out a Hot Work permit and keep it on site daily as needed.
- Q. Contractor will fill out an Above Ceiling Work Permit and keep it on site daily as needed.
- R. Contractor will obtain a Confined Space Permit, when required, and keep it on site.
- S. Contractor shall notify Information Systems 72 hours in advance of any shutdown or known interruption of required environmental services. Follow up by notifying the Service Desk.
- T. Demolition of low voltage cabling shall be performed by the Low Voltage installation contractor.
  - 1. To prevent accidental removal of in-use circuits.
  - 2. To allow for re-use of circuits where practical.

END OF SECTION

## SECTION 270500

COMMON WORK RESULTS  
FOR COMMUNICATONS

## PART 1 - PRODUCT

## 1.1 SUMMARY

- A. This section covers general work results for all Communications Division detail subsections.
- B. Work of the following sections cover a complete installation of both permanent and channel links for a data and voice communications network utilizing copper and fiber transmission media.

## PART 2 - EXECUTION

## 2.1 SCOPE OF WORK

- A. Includes, but is not limited to the following.
  - 1. The Contractor shall:
    - a. Provide and install fabric and/or either plenum, PE or PVC Innerduct, rated appropriately for the installation environment; in accordance with all applicable codes and ordinances.
    - b. Provide, install, terminate, test, label and document all fiber backbone, fiber and copper riser cable.
    - c. Provide, install, terminate, test, and document all fiber, copper voice, and data horizontal cable.
      - 1) CAT6A UTP and CAT6A F/UTP shall not be mixed on the same campus.
    - d. Provide and place all termination devices such as, but not limited to, modular patch panels, termination blocks, information outlets (jacks and plates), phone jacks, fiber distribution panels, bulkheads, connectors, and fiber fan out kits.
    - e. Provide in quantities specified interconnect components such as, but not limited to, copper patch cords, fiber patch cables and data station cables.
    - f. Provide and place horizontal and vertical cable support devices such as, but not limited to, rack and wall-mounted horizontal and vertical cable management, cable runway, communications cable runway, and all required mounting hardware, unless otherwise noted.
    - g. Provide and install all equipment mounting racks, cabinets and/or brackets.
    - h. Provide and install UL-approved fire stopping systems in all communication pass-thru, conduits, cable trays and ceiling, wall and floor penetrations in coordination with General Contractor.
    - i. Provide all appropriate consumable items required to complete the installation.
    - j. Grounding and bonding in TEC and TR rooms to grounding bus provided by Division 26.
    - k. Provide complete documentation and demonstration of work.
    - l. Completion of all punch list deficiencies within 10 working days.
    - m. Provide indexed and organized complete Test Results of all copper and fiber cable and their components.
    - n. Provide Submittals.



- o. Conduct a final document handover meeting with client, consultant, and PM to review, discuss and educate the Owner on the test results and As-Built Drawings.
- p. Provide a Manufacturer's Extended Product Warranty and System Assurance Warranty for this wiring system.

END OF SECTION

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**SECTION 270526****GROUNDING AND BONDING FOR  
COMMUNICATIONS SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. This work shall be provided by Division 26.
  - 1. Division 26 shall provide and install the communications system grounding bus bar.
  - 2. Systems other than the voice/data system shall be bonded by their respective installers or Division 26.
- B. Exception: Division 27 shall bond racks, ladders, and other conductive IT equipment and enclosures as required.
- C. Requirements of the following Division 26 Sections apply to this section:
  - 1. Basic Electrical Requirements
  - 2. Basic Electrical Materials and Methods
  - 3. Grounding and Bonding for Electrical Systems

**1.2 SUMMARY**

- A. This Section includes methods and materials for grounding and bonding Communications systems.
- B. All grounding / earthing and bonding shall be done to applicable codes and regulations. It is recommended that the requirements of IEC/TR 61000-5-2: 1.0, ANSI-J-STD-607-A, or both be observed throughout the entire cabling system.

**PART 2 - PRODUCTS****2.1 CONDUCTORS**

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
  - 1. Stranded conductors No. 6 AWG.

**2.2 CONNECTORS**

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Compression fitting – 2-hole strap.

**PART 3 - EXECUTION****3.1 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 (NEC), Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

**3.2 APPLICATIONS**

- A. Conductors: Install stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

### 3.3 INSTALLATION

- A. Grounding Conductors
  - 1. Route along shortest and straightest paths possible, unless otherwise indicated or required by Code.
  - 2. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
    - a. Jumper across all tray junctions use two-hole crimp lugs with a bolt, lock washer and nut to prevent loosening of ground connections over time.
    - b. Contractor to remove small area of powder coat or paint to create a metal to metal bonding connection.
    - c. Per current BICSI TDMM "Grounding, Bonding and Electrical Protection":
      - 1) Grounding and bonding connectors should be one of the following: Tin plated copper, copper or copper alloy
      - 2) Connections should be made using crimp connectors, or exothermic welding.
    - d. Per TIA/EIA 607-A the TBB (Telecommunications Bonding Backbone) connections "shall be made using irreversible compression-type connectors, exothermic welding or equivalent."

END OF SECTION

## SECTION 270528

## PATHWAYS FOR COMMUNICATONS SYSTEMS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Main pathways for communications systems shall be the responsibility of the Division 27 low voltage contract.
  - 1. Includes, but is not limited to, hangars, supports, J-hooks and cable tray.
  - 2. Sections 270536, 270539, and 270543\_46, are supplemental clarifications that are additions to this section. The appropriate section(s) shall add for the material used.
- B. Conduits, pathways, and boxes which are embedded within building finishes for communications systems shall be the responsibility of the Division 26 electrical contractor
- C. Requirements of the following Division 26 sections apply to this section
  - 1. Basic electrical requirements
  - 2. Basic electrical materials and methods
  - 3. Grounding, earthing, and bonding for electrical systems

## 1.2 SUMMARY

- A. Contractor shall install work following specifications, drawings, manufacturer's instructions and approved submittal data.

## PART 2 - PRODUCTS

## 2.1 CABLE PATHWAYS

- A. Comply with TIA/EIA-569-B.
- B. Pathways shall be designed and installed to meet applicable local and national building and electrical codes or regulations.
  - 1. All materials shall be UL- and/or CSA and/or ETL-approved and labeled in accordance with NEC for all products where labeling service normally applies.
  - 2. NRTL labeled for support of Category 6A cabling, designed to prevent degradation of cable performance and pinch points that could damage cable
  - 3. Materials and equipment requiring UL 94, 149 or 1863 listing shall be so labeled. Modification of products that nullifies UL labels are not permitted.
  - 4. The installed systems shall not generate, nor be susceptible to any harmful electromagnetic emission, radiation, or induction that degrades, or obstructs any equipment.
- C. Pathways consist of conduit, basket tray/ladder rack, J-hooks, surface mounted raceway and power poles.
  - 1. Basket tray shall be utilized for distribution pathways
    - a. Provides proper support and load distribution along pathways.
    - b. Flexibility, scalability, and accessibility
    - c. Ladder rack shall be used in data rooms.
  - 2. Conduits may be utilized where cable tray is not viable, providing the cross-sectional area of the conduit is greater than the cross-sectional area of the cable tray.
  - 3. J-hooks are the minimum pathway device required for all low voltage contractors for use in ceiling distribution.
    - a. Refer to section 270529.

4. Note: Surface mounted raceway and power poles should be installed only when other pathway choices are not feasible.

## 2.2 EQUIPMENT

- A. Compatibility
  1. All material and equipment as provided should be the standard Commercial-Off-The-Shelf (COTS) products of a manufacturer engaged in the manufacturing of such products. All shall be typical commercial designs that comply with the requirements specified. All material and equipment shall be readily available through manufacturers and/or distributors.
    - a. All equipment shall be standard catalogued items of the manufacturer and shall be supplied complete with any optional items required for proper installation.
    - b. Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance and backward compatibility
- B. Horizontal cables shall be installed in "clean, dry" locations that provide protection from moisture levels above the intended operating range of inside plant (ISP) cables
  1. Cable pathways shall be installed to provide protection from the elements (i.e. moisture) and other hazards.
  2. Cables and cable pathways shall be protected from detritus elements such as paints, adhesives, water and cleaners.
    - a. In case of contamination, cables shall be replaced at the General Contractors expense. Cleaning is not acceptable.
  3. Pathways shall not have exposed sharp edges that may come into contact with telecommunications cables.
- C. Pathways shall not be in elevator shafts.
- D. Grounding / Earthing and bonding of pathways shall comply with applicable codes and regulations. It is recommended that the requirements of IEC/TR3 61000-5-2 - Ed. 1.0, ANSI-J-STD-607-B, or both be observed throughout the entire cabling system.

## 2.3 SURFACE MOUNTING

- A. Surface Mount Cable Runs and Faceplate Boxes
  1. Surface mounting of cable pathway runs and/or boxes for outlets/faceplates are only authorized as a last resort and exception to running cables through the wall and above the ceiling.
  2. If surface mount cable runs are used:
    - a. Burrs will be removed from the inside of the plastic or metal surface mount pathway to prevent damage to cables pulled through the run.
    - b. Raceway manufacturer plastic bushings shall be installed at all outlet openings in raceway to prevent damage to cable.
    - c. "T", Splice, and corner pieces will be used to join runs. Runs will not be butted together without the appropriate joining pieces.

## PART 3 - EXECUTION

### 3.1 HORIZONTAL PARAMETERS

- A. Allowable Cable Bend Radius and Pull Tension:
  1. In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation.
    - a. Bend radius for 4 pair UTP and F/UTP under no load (no pulling tension) shall not exceed four (4) times the outside diameter of the cable and eight (8) times the outside diameter of the cable under load (110N/25lbf).  
Note: Cable bend radius and pulling tensions for cables other than 4 pair

- cable increase with the diameter and type of cable refer to the manufacturer's recommendations for specific requirements.
2. After installation, exposed cable and other surfaces must be cleaned free of lubricant residue. Use only lubricants specifically designed for cable installation.
- B. Pull Strings:
1. Horizontal and Vertical Pathways
    - a. The pathway installer shall:
      - 1) Provide pull strings in all new conduits, including all conduits with cable installed as part of this contract.
      - 2) Provide pull strings in all new cable trays.
      - 3) Pull string shall have a rated average breaking strength of 200 pounds.
      - 4) During pulling sessions, pull strings must move freely to prevent cable jacket/cable damage.
      - 5) Free moving pull strings shall be provided in all locations where they are utilized as part of this contract.
- C. Conduit Fill:
1. Reference manufacturer's Design Installation Guidelines manual.
  2. Comply with requirements of NFPA 70 (NEC)
  3. The number of cables placed in a pathway shall not exceed manufacture specifications, nor, will the geometric shape of a cable be affected.
    - a. Conduit pathways shall have a maximum fill ratio of 40% to allow for proper pulling tension and lay of the CAT6A F/UTP cable. A minimum of a 1" diameter conduit is required for new construction. Existing conduits will require the reduction of the number of cables placed in the conduit to meet the required fill ratio.

### 3.2 INTRA-BUILDING CABLE ROUTING

- A. Pathways
1. The backbone subsystem shall include cable installed in a vertical manner between floor telecommunications rooms and the main or intermediate cross-connect in a multi-story building and cable installed horizontally between telecommunications rooms and the main or intermediate cross-connect in a long single-story building.
  2. Adequate riser sleeve/slot space shall be available with the ability to ingress the area later in all telecommunications rooms, such that no drilling of additional sleeves/slots is necessary. Proper fire stopping is required for all sleeves/slots per national and local codes. Install fire stop material designed specifically for the building construction conditions and to meet the existing fire stop material as directed by the building engineer.
  3. Backbone pathways shall be installed or selected such that the minimum bend radius of backbone cables is kept within manufacturer specifications both during and after installation.
  4. Where redundant paths are required, they shall be separated by a minimum of 24".
    - a. Separate innerducts and/or armored fiber are required for each leg of the redundant path.
    - b. Separate physical routing for each path shall be utilized where possible.
  5. Building backbone cables shall be installed in "dry" locations that provide protection from moisture levels above the intended operating range of inside plant (ISP) cables. "Slab-on-Grade" building designs wherein pathways are installed underground on/in the poured concrete slabs that are in direct contact with the soil are considered wet locations and hence are not permitted.

END OF SECTION

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**SECTION 270529****HANGERS AND SUPPORTS FOR  
COMMUNICATION SYSTEMS****PART 1 - PRODUCTS****1.1 APPROVED PRODUCT**

- A. The J-hooks shall meet or exceed the below characteristics of construction and features
  - 1. Provide broad based support for cabling to aid in maintaining overall system performance.
  - 2. Be available in 50.8mm (2") and 101.6mm (4") options
  - 3. Come equipped with a cable retention clip
  - 4. Offers a full line of mounting accessories.

**1.2 APPROVED MANUFACTURERS**

- A. Ericson / Caddy
- B. B-Line
- C. Stiffy

**PART 2 - EXECUTION****2.1 J-HOOKS AND OTHER SUPPORTS SHALL BE INSTALLED SUCH THAT THEY:**

- A. Shall be supported with devices designed for this purpose and shall be installed independently of any other structural component. J-Hooks shall not use the suspended ceiling support wires or lighting fixture support wires.
- B. The number of cables placed into the J-hooks shall be limited to a number that will not cause a change to the geometric shape of the cables.
  - 1. Limit to a 40% fill in new construction.
- C. J-hooks shall not be spaced farther than 1.5 meters (5 ft.) apart, with a recommendation that they be spaced at 1 meter (3 ft.) apart. Note: Construction may require distances to exceed the maximum and are considered an exception requiring approval of project manager or building engineer.
- D. J-hooks or better must be installed without exception.

**2.2 UNACCEPTABLE INSTALLATIONS**

- A. Free flight of cables
- B. Resting or attaching of cables on pipes, conduits, HVAC duct work, fire sprinkler systems, basket tray, basket tray supports or on the ceiling tiles/grid.

**END OF SECTION**

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**SECTION 270533****CONDUITS AND BACK BOXES FOR  
COMMUNICATIONS SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Division 26 – Electrical work

**PART 2 - PRODUCTS****2.1 APPROVED PRODUCT**

- A. Conduits and Back boxes shall meet the construction requirements of the NEC for the type of structure and space in which they are installed and will be of the diameter and size to provide adequate fill, bend radius and connector space. Refer to section 270528.

**PART 3 - EXECUTION****3.1 CONDUIT SIZING**

- A. Conduit size shall be based on the type of cable installed and the required fill ratio and bend radius associated with the type of cable specified.
  - 1. Minimum conduit size to back box for CAT6A F/UTP shall be 1-inch EMT.
- B. Conduit and installation shall be provided by Division 26.
- C. All conduit stubs shall be installed with plastic bushings appropriate for the size of conduit used.
- D. Conduits that stub to accessible ceiling shall be installed in the direction to provide the shortest path to the TDR, complete with pull string.

**3.2 BACK BOX SIZING**

- A. New work back boxes for CAT6A F/UTP shall be a minimum of trade size 4-11/16" x 4-11/16" x 3" (depth) plus a 5/8" plaster ring to allow for proper bend radius and connector termination/installation. Side knockouts shall be avoided.
- B. Back boxes for rework shall meet the same specification as for new work.
  - 1. If existing back boxes or back boxes that are smaller due to construction restrictions, then devices such as extension rings, bezels or faceplates shall be used to modify the back box to insure proper bend radius and connector termination/installation.
    - a. Verification and approval of the size change must have DCO Infrastructure Cabling and engineering approval.

**3.3 BACK BOX COMPOSITION**

- A. All back boxes for IT systems shall be UL/CSA listed and approved for the purpose.



1. Non-metal back boxes shall not be used for any interior IT related device.

3.4 SPECIAL CONDITIONS – LEAD LINED WALLS FOR RADIATION CONTROL

- A. Refer to the complete IT Lead Lined Wall Procedure – Attachment Appendix 8

END OF SECTION

## SECTION 270536

CABLE TRAY FOR  
COMMUNICATIONS SYSTEMS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. This section shall be coordinated with Sections 270528, 270539, and 270543\_46

## 1.2 COORDINATION

- A. Prior to beginning installation, a kick-off meeting to properly coordinate the tray installation and expectations should be held. It should be arranged by the General Contractor, and at a minimum include representatives of the following trades: FP&D, Electrical (Div 26), Structured cable, Nurse Call, paging, building automation and control, plumbing, HVAC, fire sprinkler, framing, and others as applicable. The Data Center Operations Infrastructure Cabling Team will lead the meeting.
- B. The wire basket tray routing shall be approved by the low voltage CI cable contractor (Div. 27 sub-contractor), and the Data Center Operations.
- C. Where adequate space is available a Triple tier J-Hook pathway shall parallel the basket trays for other services
1. The triple tier J-Hooks shall be installed by the cable tray installer.
- D. Single J-Hooks as needed to extend beyond the triple tier, shall be installed by the trade that will be utilizing them.
- E. Cable tray shall be a high priority installation to allow adequate time for proper and complete cable installation prior to ceiling grid.

## PART 2 - PRODUCTS

## 2.1 APPROVED PRODUCT

- A. The Cable Tray shall meet or exceed the below characteristics of construction and features:
1. It shall be fully welded and available in a galvanized silver or powder coat black finish
  2. Have an optional construction using "elongated" shaped wires offering a more broad-based support for installed cables.
  3. Cable ladder shall be used in data rooms for horizontal management above the racks.
  4. Ladder shall match the manufacturer of the data racks or exact equal.
  5. Ladder shall be assembled with manufacturer approved parts and methods.
- B. APPROVED MANUFACTURES
1. WBT – Wire Basket Tray (preferred)
  2. Siemon RouteIT™ Wire Mesh Cable Tray, or equal basket type tray
  3. Cabofil per owner's approval

## 2.2 PART NUMBERS (SUBMITTAL REQUIRED)

- A. Cable Tray
1. Refer to plans for part numbers.

PART 3 - EXECUTION

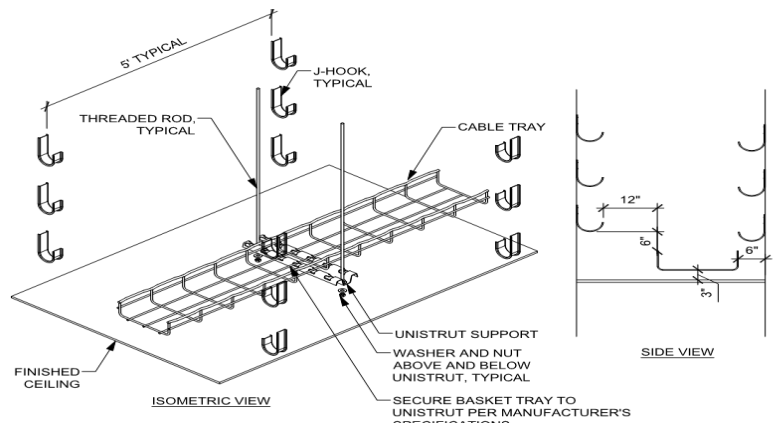
3.1 PATHWAY INSTALLATION

A. Supports

1. Installed per Manufacturer's Specifications and utilize components specific to the maintenance of proper access in and out of the cable tray using bend delimiters.
2. Distance between supports shall not exceed 5 feet
  - a. Less distance between supports required if per manufacturer's instructions.
  - b. Minimum of one support required within 24" on each side of any junction point.
3. Supports shall be of the trapeze design to provide maximum stability.
  - a. Each support shall attach to structure via its own hangers.
    - 1) All hanger supports shall be constructed of a rigid material such as all-thread.
    - 2) All hangers and supports shall be installed perpendicular and plumb to the tray. No angle supports shall be permitted unless augmented perpendicularly.
    - 3) Vibration and sway (seismic) damping required.
    - 4) Provide support across width of tray underneath, not via basket side wires.
    - 5) Building walls do not qualify as a support and shall not be used as a support.
4. Supports shall be of sufficient strength to support at least 200% of the expected load
5. Wall mounted angle brackets shall not be used as a load bearing support for cable tray.

B. Complete system access

1. Cable tray shall have a dedicated free clearance zone surrounding it.
  - a. 12" clear space shall be provided on the side where natural feed will occur.
  - b. 6" clear space shall be provided on the side opposite the feed access.
  - c. 8" clear space above the top of tray minimum – recommended 12".
  - d. 3" clear space below the tray.
2. Exception: other services may pass through the free clearance zone provided it is perpendicular to the tray direction and providing they do not exceed 6' in width or interfere with the access to pull wire in the tray.



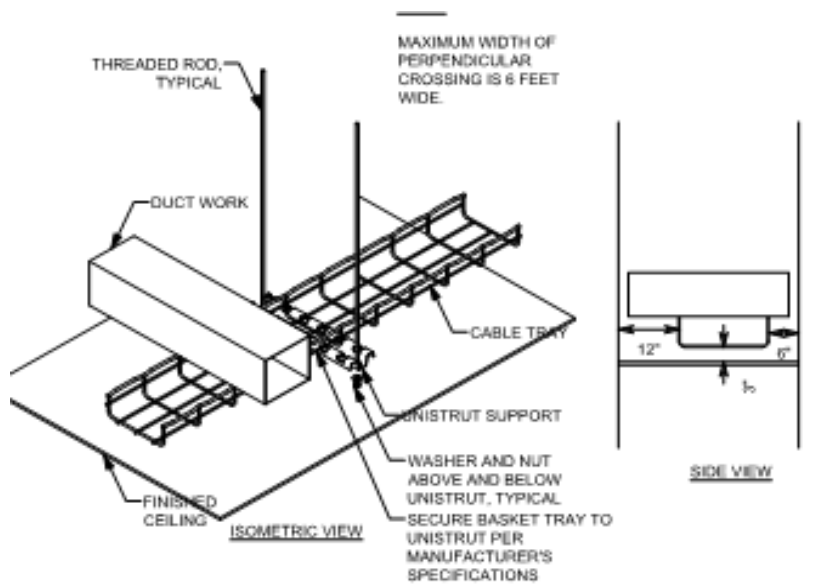
# TYPICAL CABLE TRAY WITH J-HOOK INSTALL  
NO SCALE

3.2 ROUTING OF BASKET TRAY

- A. Exact cable tray location shall be coordinated with other trades to ensure proper clearances and access. Prior to installation, final cable tray routing must be approved by the Owner's Data Center Operations/Infrastructure cabling team.
- B. Cable tray shall be installed in straight lines, either parallel or perpendicular to building lines
- C. Cable tray shall follow corridor paths
  - 1. Routing above rooms and other partitions shall be avoided
- D. Cable tray and flush penetrations shall be utilized over hard-lid areas as specified.
- E. Access panels shall be provided where needed to provide access to the cable tray on both sides of the wall in hard lid areas within 3' or less of the basket tray.

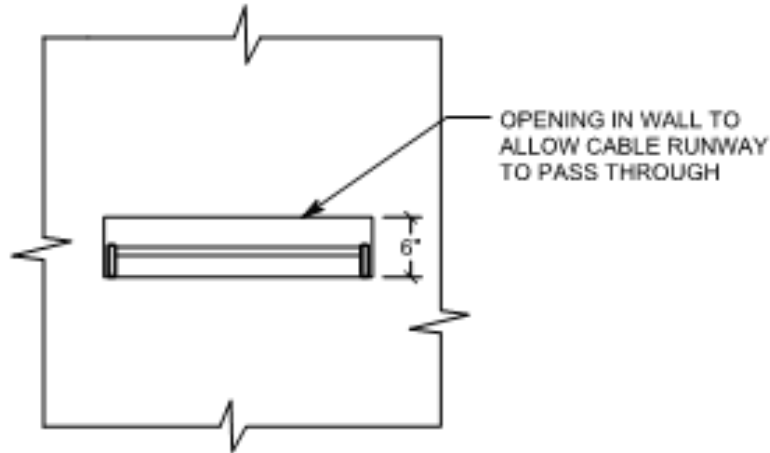
3.3 TRAY INTEGRITY

- A. Tray shall be installed as a complete, continuous system with no open spaces, cut outs, or missing segments. Bonding between sections shall be accomplished by the manufacturer's approved clamp or designated method.
- B. Tray shall be free from obstructions, other systems, trash or debris. Access to the tray shall be provided as outlined.
- C. There shall not to be any other trades infrastructure or equipment attached to or supported by the basket tray or basket tray support system.
- D. Tray must not be notched or cut-out to accommodate other trades. Repairs will not be accepted. Section replacement will be required at no cost to owner.
- E. As much tray material as possible shall be left uncut at turns, junctions, elevation changes, width changes, etc. Overlap shall be clamped to maximize strength and prevent pinch points.



**TYPICAL CABLE TRAY WITH PERPENDICULAR CROSSING**

PART 4 - #



PART 5 - #

## CABLE RUNWAY THROUGH WALL DETAIL

### 5.1 WALL OR OTHER PENETRATIONS (SUBMITTAL REQUIRED)

- A. Fire and smoke rated assemblies
  - 1. Penetrations shall comply with all fire and smoke prevention methods per codes and as outlined elsewhere in this document, including Section 270528 and Division 7.
- B. Approved penetration methods
  - 1. Preferred barrier penetration method shall be to run the tray continuous through the barrier, with closure provided by Firestop pillows.
    - a. Framing shall be boxed around openings to permit proper pillow insertion. Coordinate with framing contractor.
  - 2. Sleeves or conduits
    - a. EZ-Path or alternate penetrations must provide 150% of the designed cross-sectional area of the basket.
    - b. Conduit permitted only with written pre-bid permission or engineering notation on the drawings.
    - c. Each penetration sleeve or conduit shall be bonded on both sides of the penetrated barrier using UL and AHJ approved methods.
  - 3. All penetrations shall be positioned in-line with the cable tray to facilitate ease of pulling conductors and provide a straight-line path.
    - a. The bottom of the penetration device shall be flush with the bottom of the cable tray
    - b. Side-to-side penetrations must be completely within the cable tray space or directly above whenever possible.
  - 4. Approved penetration devices shall be a minimum size of 4"
    - a. Total penetration space at each location shall be sized for 20% growth and be equal to or greater than the cross-sectional area of the basket tray.
    - b. Approved devices where smaller penetrations are permitted shall be a minimum size of 1".

5. Approved devices shall be approved by the local facility manager:
  - a. Fire rated STI EZ-Path
  - b. Hilti self-sealing device
  - c. Tray with enclosed wall and properly sized and installed pillows
  - d. Conduit sleeves
    - 1) Conduit sleeves should only be used as a last resort upon approval from owner's Data Center Operations Infrastructure Cabling representative.

## 5.2 UTILIZATION

- A. Capacity
  1. Trays and penetration devices shall be properly sized
    - a. Provide a maximum calculated fill ratio of 40% to an inside depth not to exceed 3 inches (75 mm)
    - b. Provide capacity to allow for at least 20% future growth
- B. Systems served
  1. Cable trays, J-hooks, and penetrations shall be dedicated to a single system. Mixing of other systems with voice and data shall not be permitted in tray or J-hook paths.
  2. Exception: Different systems may share cable tray providing the following conditions are met:
    - a. Less than 40% overall fill is maintained, plus 20% additional space for growth
    - b. There is a minimum 3" separation between systems
    - c. There is a grounded physical divider between systems
- C. Restricted content in trays
  1. The wire basket tray shall only contain cables for the voice and data communications systems.
    - a. If there is sufficient space in the tray, and with approval from both the data network sub-contractor and the Data Center Operations, certain other IP services may share tray space. (i.e. camera, telemetry, similar).
    - b. Service loops must not reduce tray capacity.
    - c. Nurse call cabling shall be run in the J-Hook path. All nurse call installations must provide their own path or utilize the triple J-Hook system.
- D. Triple J-Hook path assignments
  1. The Lower tier of the triple J-Hook path is designated for Card Access and building automation and controls
  2. The Middle tier of the triple J-Hook path may alternately be utilized for Nurse Call, or other EMI producing systems.
  3. The Top tier of the triple J-Hook path is designated for satellite, DAS, or similar systems.
  4. When a triple J-hook pathway is not installed or available each system provider shall install their own j-hook pathway and wall penetrations.
  5. Service loop and slack shall not interfere with other pathways.

END OF SECTION

## SECTION 270543/46

UNDERGROUND DUCTS, UTILITY POLES,  
AND RACEWAYS FOR INTER-  
BUILDING/CAMPUS CABLE ROUTING

## PART 1 - PRODUCTS

## 1.1 INTER-BUILDING/CAMPUS CABLE ROUTING

- A. The backbone subsystem shall include cable installed between buildings via approved underground, tunnel, direct -buried, aerial or any combination of these from the Campus Distributor/Main Cross-connect (CD/MC/TEC) to Building Distributor/Intermediate Cross-connect (BD/IC/TDR) in a multi-building campus.
  - 1. 4" Conduit is required
  - 2. (3) 1 ¼" inner ducts shall be installed in all 4" conduits going building to building.
  - 3. Armored Fiber is required.
  - 4. Microduct/microfiber is optional.
- B. Backbone pathways shall be installed or selected such that the minimum bend radius and pulling tension of backbone cables is kept within cable manufacturer specifications both during and after installation.
- C. In an underground system, adequate underground conduit space shall be available and accessible at each building. The conduits shall not exceed a fill ratio of 40%.
  - 1. All underground systems shall be designed to prevent water runoff from entering the building. All underground systems must be cleared of any moisture prior to installation of any cable type. These systems must be sealed at both ends when not in use and after cable installation to prevent moisture and rodent infiltration.

## PART 2 - EXECUTION

## 2.1 INSTALLATION

- A. The backbone cables shall be installed in a hierarchical star topology, emanating from the Campus Distributor/Main Cross-connect to each satellite building, Building Distributor/Intermediate Cross-connect or Floor Distributor/Horizontal Cross-connect located in a telecommunication room. All Inter-building/Campus cables shall be installed to the applicable codes and regulations.
- B. Where redundant paths are required, they shall be separated by a minimum of 24".
  - 1. Separate innerducts are required for each leg of the redundant path.
  - 2. Separate physical routing for each path shall be utilized where possible.
- C. Optical fiber shall be run for all Inter-building/Campus backbone segments, and as a recommendation, at least one balanced twisted-pair cable should be run for each Inter-building backbone segment.
  - 1. Fibers will be Fusion Spliced in the telecommunications rooms using LC Pigtails in wall mounted interconnect centers or rack mounted panels equipped with sufficient ports, slack storage space and splice trays if required to terminate and secure all fibers.
- D. ST connectors are no longer recommended in the TIA 568-C.3 standard but may be used in legacy installations.
- E. Over-voltage Circuit Protection shall be utilized for cabling which enters or exits a building shall comply with applicable codes and regulations.
- F. OSP (outside plant) cables shall transition to an ISP (inside plant) within 50 feet of changing environment, per national and local codes and regulations.

END OF SECTION



## SECTION 270553

IDENTIFICATION FOR LOW-VOLTAGE  
CABLES AND LABELING

## PART 1 - GENERAL

## 1.1 NOT USED

## PART 2 - PRODUCTS

## 2.1 LABELING

- A. Structured cabling shall be labeled in accordance with ANSI/TIA 606-B standards.
- B. A unique identifier shall be marked on each faceplate to identify it as connecting hardware.
- C. Each port in the faceplate shall be labeled with its identifier.
- D. A unique identifier shall be marked on each piece of connecting hardware to identify it as connecting hardware.
- E. Each port on the connecting hardware shall be labeled with its identifier.
- F. Cable Labeling
  - 1. Label System
    - a. Labels Identification (Labeling) System:
      - 1) Brady
      - 2) Dymo
      - 3) Hellerman-Tyton
      - 4) Panduit
      - 5) Acceptable alternate
        - a) Approval from Data Center Operations Infrastructure Cabling team member required prior to bid
  - 2. Cable Labels
    - a. Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations. Plastic, self-adhesive labels are not acceptable.
    - b. Each end of the Horizontal cables shall be labeled with a mechanically generated label within 300mm (12 in) of the end of the cable jacket with the link identifier which shall be a unique configuration determined by owner. This also applies to the Backbone Cables.
  - 3. Flat-surface labels
    - a. Self-adhesive vinyl or vinyl-cloth labels, machine printed with alphanumeric cable designations
  - 4. Contractor shall:
    - a. Provide transparent plastic label holders, and 4 pair marked colored labels.
    - b. Install colored labels according to the type of field as per ANSI/TIA 606-B.1 color code designations.
- G. PALLETTE
  - 1. Use the owners color-code guidelines for voice, data, cross-connect, riser, and backbone fields. Otherwise, use the ANSI/TIA 606-B designation strip color-code guidelines for voice, data, cross-connect, riser, and backbone fields. Color designations for F/UTP cable:
    - a. Intermountain Healthcare Standard Wiring Palettes for Horizontal Cabling

b.	Use	Color
	1) Data & IP Phones	Blue
	2) Analog Phone	Blue
	3) Security Card Readers	Grey/Yellow
	4) IP Security Cameras	Blue
	5) Fire Systems	Red
	6) TV Coax	Black
	7) Public Address/Telecom Patching in TEC only	White
	8) Clinical Engineering –	Orange
	a) Monitoring, Bed Systems	Orange
	b) Nurse Call (5e)	Orange
	c) Real time patient data	Orange
	9) Wireless	Yellow
	10) Foreseer (Belden 1422)	Red
H.	Outlet/Jack/Faceplate Icons/labeling will match the color of the cable attached to the back side of the outlet/jack.	

### PART 3 - EXECUTION

#### 3.1 GENERAL IDENTIFICATION

- A. Installer shall label all cable, regardless of length.
- B. Identify system components, wiring, and cabling complying with TIA/EIA-606-B.1. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- C. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
- D. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.
- E. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- F. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications rooms, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-B.1. Furnish electronic record of all drawings, in software and format selected by Owner

#### 3.2 CONCEALED ENDS

- A. Jacks, connectors, terminations, and similar that are in concealed locations such as above grid ceilings, shall have additional labeling. The additional label shall be on the face of the grid in a visible location, immediately adjacent to the termination location.

#### 3.3 CABLE AND WIRE IDENTIFICATION

- A. Label each cable visibly within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

- B. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
- C. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
  - 1. Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building mounted device shall be identified with name and number of particular devices as shown.
  - 2. Label each unit and field within distribution racks and frames.
- D. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-B.1.

END OF SECTION

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**SECTION 271100****EQUIPMENT ROOM FITTINGS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Requirements of the following Division 26 sections apply to this section
  - 1. Basic electrical requirements
  - 2. Basic electrical materials and methods
  - 3. Grounding, earthing, and bonding
- B. Standards
  - 1. Minimum equipment room specifications shall comply with the 2010 AIA Guidelines for Design and Construction of Healthcare Facilities.
  - 2. Minimum recommended room sizes are requirements, not suggestions.
  - 3. Enterprise IS Architecture (EISA) maintains several documents around standards. The primary standards list is the EISA Standards 2010 – Master List. Occasionally, there is a need to breakout specific standards for an area.

**1.2 SUMMARY**

- A. This Section specifically details the facilities design and operations standards to be utilized for Intermountain Health Care's Data Rooms (TEC) and data closets (TDR).

**1.3 COMMON REQUIREMENTS**

- A. Rack layout and mounting
  - 1. Standard room layouts are located on the plans.
- B. Rack and wall mounting locations
  - 1. Rack and wall space use is pre-designated at the design stage. Before mounting any equipment on a wall or in a rack, the location must be verified by the Div 27 sub-contractor and the Data Center Operations.

**1.4 DEFINITIONS**

- A. **Data Center** – Major computer/technology/network facilities providing a significant percentage of the data and application services for the enterprise.
- B. **Data Rooms – ((TEC) Technology Equipment Center)** – Purpose built buildings or rooms that provide communications point-of-presence along with some data and applications services for a local facility or region.
- C. **TSER (Telecommunications Service Entrance Room)** – Houses the point at which data and voice circuits and services enter the facility and outdoor cabling interfaces with the building infrastructure. Typically, the TSER will be located in the TEC.
- D. **Data Closets – ((TDR) Technology Distribution Room)** – Specific location within a facility that provides communication services for a specific area (floor, wing, office area) of that facility only. A secure, flexible, and easily managed location for the structured cabling systems, network electronics, clinical systems, nurse call systems, and other technology and communications equipment.

**PART 2 - TECHNOLOGY ROOM SPECIFIC REQUIREMENTS****2.1 TECHNOLOGY EQUIPMENT CENTER (TEC)**

- A. Each Hospital will have a dedicated TEC which will serve as the main communications point-of-presence along with data and application services for the local facility or region. Houses the core networking equipment, application servers and data storage devices that serve the buildings on the campus. The Telecommunications Service Entrance Room (TSER) will be in the same room.

## 2.2 TEC IN HOSPITALS

- A. Physical Construction
  1. The TEC should be in an area easily accessed for delivery of equipment and high traffic without disturbing patient care.
  2. The size of the TEC will be based on the number of cabinets required to support the campus, plus 30% growth.
  3. Walls will be constructed from the floor to the deck and be completely sealed from surrounding spaces.
  4. A minimum 50% of open wall space will have ¾" fire rated plywood covering the walls.
  5. Fire rated plywood shall be painted with fire resistant paint, leaving the fire rating stamp un-painted.
  6. The TEC should not have a ceiling other than the deck.
  7. Static Dissipative Tile is required in the TEC.
  8. The door to the TEC shall be 8' tall and 4' wide to accommodate the cabinet height.
  9. The walls of the TEC should not have any windows installed.
- B. Layout
  1. Cabinets will be in a cold isle configuration.
  2. Containment will be installed, including removable ceiling panels and isle doors.
- C. Electrical
  1. The electrical distribution system will follow an A (BLUE) – B (RED) design.
  2. Each system A (BLUE) and B (RED) will be backed up by a dedicated UPS.
  3. Outlet type is L21-30
  4. All power is to be run in conduit.
  5. Lighting will be installed above each isle.
- D. Mechanical
  1. The mechanical system will be a precision cooling solution installed in an in row, N+1 configuration designed to maintain 72 degrees F at mid cabinet.
  2. The mechanical system will be redundant and concurrently maintainable including on the electrical supply.
  3. The system shall meet engineering specifications for the room at 110 degrees outside air at 4500 feet above sea level.
  4. Chilled water, DX (Air Cooled) and Glycol (30% polyethylene glycol to water) are all acceptable cooling strategies.
- E. Security
  1. Doors will be fitted with an auditable card reader.
- F. Fire System
  1. A pre-action dry pipe fire system will be installed
- G. Monitoring
  1. Eaton Forseer system will be used to monitor all critical systems.
  2. Foreseer cables will be run to all UPSs, cooling units and TDRs.
  3. One Cat 6a F/UTP cable to each UPS.

## 2.3 TEC in Clinics and Office Buildings

- A. Clinics and Offices will have a room which will serve as a TEC and TDR. This room will be sized to accommodate the multifunction of the space.

## 2.4 TEC/TDR in Clinics

- A. Physical Construction
  1. TDRs should be in a central location off the main corridor away from patient areas.
  2. TDRs should be stacked from floor to floor.
  3. TDR size will be at least 12' x 14'.
  4. Walls will be constructed from the floor to the deck and be completely sealed from surrounding spaces.
  5. A minimum 50% of open wall space will have  $\frac{3}{4}$ " fire rated plywood covering the walls.
  6. Fire rated plywood shall be painted with fire resistant paint, leaving the fire rating stamp un-painted.
  7. The TDR should not have a ceiling other than the deck.
  8. Flooring can be Static Dissipative Tile or Epoxy Paint.
  9. 3' wide door is required.
  10. When permissible, doors shall swing out of the room to provide maximum available space and rapid egress.
- B. Layout
  1. Racks in a single row with the front being the cold isle.
  2. The front of the racks should face the door.
- C. Electrical
  1. The electrical distribution system will follow an A (BLUE)-B (RED) design.
  2. System A(BLUE) will be backed up by a dedicated UPS.
  3. System B(RED) will be from a dedicated utility circuit.
  4. Outlet type is L6-30 and L5-20.
  5. All power is to be run in conduit.
  6. Lighting will be installed above each isle.
- D. Mechanical
  1. TDRs will have redundant cooling
    - a. Primary cooling is from the facility cooling system via a dedicated source.
    - b. Secondary cooling is from a standalone split or ceiling mount source.
    - c. The secondary system will be fed from the facility generator equipment electrical source if available.
    - d. The Mechanical system will be designed to maintain 72 degrees F at mid rack.
    - e. The coordination scheme between primary and secondary cooling systems can be accomplished by setting the primary system to 72 degrees F and the secondary system to 75 degrees F.
- E. Security
  1. Doors will be fitted with an auditable card reader.
- F. Fire System
  1. TDRs will utilize the facility fire detection and suppression systems.
  2. Sprinkler heads should have a 200-degree fuse.
  3. Sprinklers should be protected from accidental activation.
- G. Monitoring
  1. TDRs will be monitored using Eaton/Foreseer.
  2. Run 3 foreseeer cables to each TDR.
  3. One Cat6a F/UTP cable to each UPS.

## 2.5 TEC/TDR in Offices

- A. Physical Construction
  1. TDRs should be in a central location off a main corridor.
  2. TDRs should be stacked from floor to floor.
  3. TDR size will be at least 12' x 14'.

4. Walls will be constructed from the floor to the deck and be completely sealed from surrounding spaces.
  5. A minimum 50% of open wall space will have ¾" fire rated plywood covering the walls.
  6. Fire rated plywood shall be painted with fire resistant paint, leaving the fire rating stamp un-painted.
  7. The TDR should not have a ceiling other than the deck.
  8. Flooring can be Static Dissipative Tile or Epoxy Paint.
  9. 3' wide door is required.
  10. When permissible, doors shall swing out of the room to provide maximum available space and rapid egress.
- B. Layout
1. Racks in a single row with the front being the cold isle.
  2. The front of the racks should face the door.
- C. Electrical
1. The electrical distribution system will follow an A (BLUE)-B (RED) design.
  2. System A(BLUE) will be backed up by a dedicated UPS.
  3. System B(RED) will be from a dedicated utility circuit.
  4. Outlet type is L6-30 and L5-20.
  5. All power is to be run in conduit.
  6. Lighting will be installed above each row.
- D. Mechanical
1. TDRs will have redundant cooling system designed to maintain 72 degrees F at mid rack.
    - a. Primary cooling is from the facility cooling system via a dedicated source.
    - b. Secondary cooling is from a standalone split or ceiling mount source.
      - 1) The secondary system will be fed from the facility generator equipment electrical source if available.
    - c. The coordination scheme between primary and secondary cooling systems can be accomplished by setting the primary system to 72 degrees F and the secondary system to 75 degrees F.
  2. Doors will be fitted with an auditable card reader.
- E. Fire System
1. TDRs will utilize the facility fire detection and suppression systems.
  2. Sprinkler heads should have a 200-degree fuse.
  3. Sprinklers should be protected from accidental activation.
- F. Monitoring
1. TDRs will be monitored using Eaton/Foreseer.
  2. Run 3 foreseeer cables to each TDR.
  3. One Cat 6a F/UTP cable to each UPS.

## 2.6 TECHNOLOGY DISTRIBUTION ROOM (TDR)

- A. There shall be a minimum of one TDR on each floor of the facility. TDR's shall be provided throughout the facility as necessary to meet the 292' (90-meter) maximum cables distance. The TDR is located on each floor within a facility to house equipment and cabling, providing communication and technology services for a specific area of that facility. Based on the different needs of different facilities, the TDR's will be broken down into three categories. Hospital, Clinic and Office spaces.

## 2.7 TDR IN HOSPITALS

- A. Physical Construction
1. TDRs should be in a central location off a main corridor and away from patient areas.
  2. TDRs should be stacked from floor to floor.

3. TDR size will be at least 14' x 16'.
  4. Walls will be constructed from the floor to the deck and be completely sealed from surrounding spaces.
  5. A minimum 50% of open wall space will have ¾" fire rated plywood covering the walls.
  6. Fire rated plywood shall be painted with fire resistant paint, leaving the fire rating stamp un-painted.
  7. The TDR should not have a ceiling other than the deck.
  8. Flooring can be Static Dissipative Tile or Epoxy Paint.
  9. 3' wide door is required.
  10. When permissible, doors shall swing out of the room to provide maximum available space and rapid egress.
- B. Layout
1. Racks will be in a cold isle configuration.
  2. Two rows with the cold isle in the middle.
- C. Electrical
1. The electrical distribution system will follow an A (BLUE)-B (RED) design.
  2. Each system A(BLUE) and B(RED) will be backed up by a dedicated UPS.
  3. Outlet type is L6-30 and L5-20.
  4. All power is to be run in conduit.
  5. Lighting will be installed above each row.
- D. Mechanical
1. TDRs will have redundant cooling designed to maintain 72 degrees F at mid rack.
    - a. Primary cooling is from the facility cooling system via a dedicated source.
    - b. Secondary cooling is from a standalone split or ceiling mount source.
    - c. The secondary system will be fed from the facility generator equipment electrical source if available.
    - d. The coordination scheme between primary and secondary cooling systems can be accomplished by setting the primary system to 72 degrees F and the secondary system to 75 degrees F.
- E. Security
1. Doors will be fitted with an auditable card reader.
- F. Fire System
1. TDRs will utilize the facility fire detection and suppression systems.
  2. Sprinkler heads should have a 200-degree fuse.
  3. Sprinklers should be protected from accidental activation.
- G. Monitoring
1. TDRs will be monitored using Eaton/Foreseer.
  2. Run 3 foreseer cables to each TDR.
  3. One Cat 6a F/UTP cable to each UPS.

## 2.8 TDR in Clinics

- A. Physical Construction
1. TDRs should be in a central location off a main corridor and away from patient areas.
  2. TDRs should be stacked from floor to floor.
  3. TDR size will be at least 10' x 12'.
  4. Walls will be constructed from the floor to the deck and be completely sealed from surrounding spaces.
  5. A minimum 50% of open wall space will have ¾" fire rated plywood covering the walls.
  6. Fire rated plywood shall be painted with fire resistant paint, leaving the fire rating stamp un-painted.
  7. The TDR should not have a ceiling other than the deck.



8. Flooring can be Static Dissipative Tile or Epoxy Paint.
  9. 3' wide door is required.
  10. When permissible, doors shall swing out of the room to provide maximum available space and rapid egress.
- B. Layout
1. Racks in a single row with the front being the cold isle.
  2. The front of the racks should face the door.
- C. Electrical
1. The electrical distribution system will follow an A (BLUE)-B (RED) design.
  2. System A(BLUE) will be backed up by a dedicated UPS.
  3. System B(RED) will be from a dedicated utility circuit.
  4. Outlet type is L6-30 and L5-20.
  5. All power is to be run in conduit.
  6. Lighting will be installed above each isle.
- D. Mechanical
1. TDRs will have redundant cooling designed to maintain 72 degrees F at mid rack
    - a. Primary cooling is from the facility cooling system via a dedicated source.
    - b. Secondary cooling is from a standalone split or ceiling mount source.
    - c. The secondary system will be fed from the facility generator equipment electrical source if available.
    - d. The coordination scheme between primary and secondary cooling systems can be accomplished by setting the primary system to 72 degrees F and the secondary system to 75 degrees F.
- E. Security
1. Doors will be fitted with an auditable card reader.
- F. Fire System
1. TDRs will utilize the facility fire detection and suppression systems.
  2. Sprinkler heads should have a 200-degree fuse.
  3. Sprinklers should be protected from accidental activation.
- G. Monitoring
1. TDRs will be monitored using Eaton/Foreseer.
  2. Run 3 foreseeer cables to each TDR.
  3. One Cat 6a F/UTP cable to each UPS.

## 2.9 TDR in Offices

- A. Physical Construction
1. TDRs should be in a central location off a main corridor.
  2. TDRs should be stacked from floor to floor.
  3. TDR size will be at least 10' x 12'.
  4. Walls will be constructed from the floor to the deck and be completely sealed from surrounding spaces.
  5. A minimum 50% of open wall space will have ¾" fire rated plywood covering the walls.
  6. Fire rated plywood shall be painted with fire resistant paint, leaving the fire rating stamp un-painted.
  7. The TDR should not have a ceiling other than the deck.
  8. Flooring can be Static Dissipative Tile or Epoxy Paint.
  9. 3' wide door is required.
  10. When permissible, doors shall swing out of the room to provide maximum available space and rapid egress.
- B. Layout
1. Racks in a single row with the front being the cold isle.
  2. The front of the racks should face the door.
- C. Electrical
1. The electrical distribution system will follow an A (BLUE)-B (RED) design.

2. System A(BLUE) will be backed up by a dedicated UPS.
  3. System B(RED) will be from a dedicated utility circuit.
  4. Outlet type is L6-30 and L5-20.
  5. All power is to be run in conduit.
  6. Lighting will be installed above each isle.
- D. Mechanical
1. TDRs will have redundant cooling designed to maintain 72 degrees F at mid rack.
    - a. Primary cooling is from the facility cooling system via a dedicated source.
    - b. Secondary cooling is from a standalone split or ceiling mount source.
    - c. The secondary system will be fed from the facility generator equipment electrical source if available.
    - d. The coordination scheme between primary and secondary cooling systems can be accomplished by setting the primary system to 72 degrees F and the secondary system to 75 degrees F.
- E. Security
1. Doors will be fitted with an auditable card reader.
- F. Fire System
1. TDRs will utilize the facility fire detection and suppression systems.
  2. Sprinkler heads should have a 200-degree fuse.
  3. Sprinklers should be protected from accidental activation.
- G. Monitoring
1. TDRs will be monitored using Eaton/Foreseer.
  2. Run 3 foreseer cables to each TDR.
  3. One Cat 6a F/UTP cable to each UPS.

### PART 3 - EXECUTION

#### 3.1 COMMON REQUIRED CHARACTERISTICS FOR TDR, TEC, & TSER

- A. SECURITY - COMMON
1. Any visitor, vendor, or contractor requiring access to a Technology Room, who does not have appropriate approvals or clearances, must be escorted by a properly credentialed tech from the appropriate system.
  2. The main technology equipment shall be secured in a dedicated, locked Technology Room.
  3. Unused access jacks should be disconnected from the patch panels, and unused switch ports disabled.
  4. Technology Rooms shall be dedicated to the data and telecommunications functions.
  5. Access to the Technology Room shall be restricted to authorized service personnel and shall not be shared with building services that may interfere with the main networking interfaces, the networking equipment, the application servers, data storage devices, and telecommunications equipment systems.
  6. Technology Rooms shall not be used for building maintenance services, custodial services, or be used for general storage.
  7. Security cameras may be installed in each Technology Room upon owner's preference.
    - a. At entrances
    - b. At the end of each row of equipment racks
    - c. In electrical and mechanical rooms serving the Technology Room
    - d. Approved camera manufacturers: Axis and Bosch
  8. Access to a Technology Room shall be restricted and controlled by an auditable access control system. The access control system shall comply with the requirements of this document.
  9. All secure data areas must be secured by an auditable badge reader system.

- a. Refer to plans or quotes for detailed information
- b. Approved supplier: Intermountain Lock and Security Supply /  
3106 S Main St / Salt Lake City, UT 84115 / 801-486-0079
- c. Owner of security locks and badge readers:  
Intermountain Healthcare Data Center
- d. For programing on the Medeco XT Electronic Keys contact:  
Intermountain Healthcare Data Center

#### B. PHYSICAL ENVIRONMENT

1. The Technology Room shall be in a dry area not subject to flooding and should be as close as possible to the electrical service room in order to reduce the length of the bonding conductor to electrical grounding system.
2. The Technology Room shall be in an accessible, non-sterile area.
3. Access to the Technology Room shall be directly off a corridor and not through another space.
4. The Technology Room shall be located to avoid large ducts, beams, and other building elements that may interfere with proper cable routing and may limit future access.
5. Mechanical and electrical equipment or fixtures not directly and exclusively related to the support of the Technology Room shall not be installed in, pass through, or enter the Technology Room.
6. Technology rooms shall not be located on exterior walls.
7. Technology rooms shall not have windows or other exterior openings.

### 3.2 TECHNOLOGY DISTRIBUTION ROOM (TDR) / DATA CLOSET

#### A. ELECTRICAL ENVIRONMENT

1. Separation from sources of EMI shall be in accordance with ANSI/TIA/EIA-569-C and local codes.
2. Communication grounding/earthing and bonding shall be in accordance with applicable codes and regulations. It is recommended that the requirements of IEC/TR3 61000-5-2 - Ed. 1.0, ANSI-J-STD-607-C, or both be observed throughout the entire cabling system.
  - a. All racks, equipment frames, furniture, flooring, ductwork within the IT space shall be bonded to the Central Ground bar provided and installed by Division 26.
    - 1) No AC electrical equipment bonding will be done at the Central Ground Bar. AC electrical grounding and bonding will be done according to the NEC.
3. Some TDRs will require redundant power and data feeds. See plans and drawings.
4. Lighting in the TDRs should be a minimum of 500 lx (50-foot candles) at the lowest point of termination.
  - a. Light switch should be easily accessible when entering the room.
  - b. Lighting will be fed from the generator system or have fixtures with battery backup.
5. A minimum of two dedicated duplex or two dedicated simplex electrical outlets, each on a separate 120V 20A circuit, should be provided for equipment power. Additional convenience duplex outlets should be placed at 1.8 m (6 ft) intervals around the perimeter walls.
  - a. Only twist lock receptacles will be used for rack power points. Type L-6-30R for 208 volt and type Nema L-5-20R for 120 volt.
6. All power is to originate from the facilities generator backup system with one system (A-B) originating from the critical system.
7. All circuits serving the TDR and the equipment within it shall be dedicated to serving the TDR.

8. TDRs shall be connected by a backbone of insulated, #6 (minimum) to 3/0 AWG stranded copper cable between all technology rooms. This cable shall be provided and installed by Division 26.
- B. MECHANICAL ENVIRONMENT
1. Reliable cooling shall be provided.
    - a. Based on criticality tiering structure individual rooms may require redundant, concurrently maintainable cooling systems.
    - b. Tier structure level shall be determined from the design guide.
  2. Heat load shall be calculated at 4KW per equipment rack
  3. Temperature and humidity in the TDR shall be controlled to an operating range of 64 to 75 degrees F (18 to 24 degrees C) with 30 to 55 percent relative humidity.
- C. EQUIPMENT
1. Each TDR shall be connected to the TEC (Technology Equipment Center) to provide a building-wide network and communications system.
  2. All racks, cabinets, sections of cable tray, and metal components of the technology system that do not carry electrical current shall be grounded.

### 3.3 TECHNOLOGY EQUIPMENT CENTER (TEC) / DATA ROOM

- A. ELECTRICAL ENVIRONMENT
1. The TDR and TEC electrical environments shall match with the following exceptions:
  2. All circuits serving the TEC and the equipment within it shall be dedicated to serving the TEC.
- B. MECHANICAL ENVIRONMENT
1. TEC and TSER have the same mechanical environment.
  2. Reliable cooling shall be provided.
  3. Heat load shall be calculated at 4KW per equipment rack
  4. Temperature and humidity in the TEC shall be controlled to an operating range of 64 to 75 degrees F (18 to 24 degrees C) with 30 to 55 percent relative humidity.
- C. EQUIPMENT
1. Each TEC shall be connected to the TSER (Telecommunications Service Entrance Room) to provide an enterprise-wide network and communications system.
  2. All racks, cabinets, sections of cable tray, and metal components of the technology system that do not carry electrical current shall be grounded.

### 3.4 TELECOMMUNICATION SERVICE ENTRANCE ROOM (TSER) / D-MARC

- A. PURPOSE
1. The TSER (Telecommunications Service Entrance Room) equipment subsystem shall consist of shared (common) electronic communications equipment in the TEC or the TSER required to interface this equipment and distribution hardware to the transmission media of enterprise Wide Area Network (WAN) infrastructure.
  2. The TSER shall be equipped to contain telecommunications equipment, cable terminations, and associated cross-connects.
    - a. Note that the AIA/State guidelines specify that the minimum size for a TSER is 12' by 14'.
    - b. Doors shall swing out of the room to provide maximum available space and rapid egress.
      - 1) Exception: where prohibited by fire or safety code.
  3. The TSER shall be dedicated to the telecommunications function.
- B. MECHANICAL ENVIRONMENT
1. Reliable cooling and heating shall be provided.
  2. Temperature and humidity in the TSER shall be controlled to an operating range of 64 to 75 degrees F (18 to 24 degrees C) with 30 to 55 percent relative

- humidity.
- C. EQUIPMENT
1. The TSER (Telecommunications Service Entrance Room) shall be connected to the specified WAN equipment to provide connectivity to the enterprise-wide network and communications system.
  2. All racks, cabinets, sections of cable tray, and metal components of the technology system that do not carry electrical current shall be grounded.

END OF SECTION

## SECTION 271116

CABINETS, RACKS, FRAMES,  
AND ENCLOSURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Cabinets and racks specifications are in TIA569-C and in the ET pages of the plans.

## PART 2 - PRODUCTS

## 2.1 APPROVED PRODUCT

## A. OPEN RACKS

1. For rack-mounted installations in a telecommunications room the installer shall use a 19 inch by 3-inch-deep equipment rack.
  - a. Equipment Rack 19" X 8', 52 RU, Black – Chatsworth 55053-715
  - b. Equipment Rack 19" X 7', 45 RU, Black – Chatsworth 55053-703
  - c. Exception: Where other size cabinets are specified by design team at owner's direction

## B. WIRE MANAGERS

1. Part Numbers
  - a. Vertical Wire Manager, Double Sided, Black 10" wide x 8' tall – Chatsworth 40096-715
  - b. Vertical Wire Manager, Double Sided, Black 10" wide x 7' tall – Chatsworth 40096-703
  - c. Horizontal Wire Manager, 4U – Panduit PEHF4
2. Typical Standard Layout
  - a. Layout is 10" vertical manager, then 19" rack, then 10" vertical manager, then 19" rack, then 10" vertical manager.
  - b. Where more than 2 racks are called for, maintain the pattern of 10" vertical wire management on the ends, and 10" vertical management between racks.

## C. CABINETS

1. Standard Cabinet
  - a. 2-Sided Cabinet – Vertiv E4562121120001S
  - b. 1-Sided Cabinet – Vertiv E4562122120001S
2. Wall Mount Cabinet
  - a. Vertical Wall Mount Cabinet – Legrand VWMSD-4RU-42-B
  - b. Vertical Wall Mount Cabinet – Legrand VWMSD-8RU-42-B
  - c. Fixed Mounting Rail Kit – Legrand VWM-RR-4RU
  - d. Fixed Mounting Rail Kit – Legrand VWM-RR-8RU
  - e. Pivoting Mounting Rail Kit – Legrand VWM-PIV-4RU
  - f. Fan Kits with 115 VAC fans – Legrand VWMFK-115
  - g. Top Brush Grommet Kit – Legrand VWMBGK
  - h. Circular Knockout Grommet Kit – Legrand VWMGR-30

END OF SECTION

## SECTION 271119

TERMINATION BLOCKS AND  
PATCH PANELS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Requirements of the following Division 26 sections apply to this section
  - 1. Basic electrical requirements
  - 2. Basic electrical materials and methods
  - 3. Grounding, Earthing, and Bonding

## PART 2 - PRODUCTS

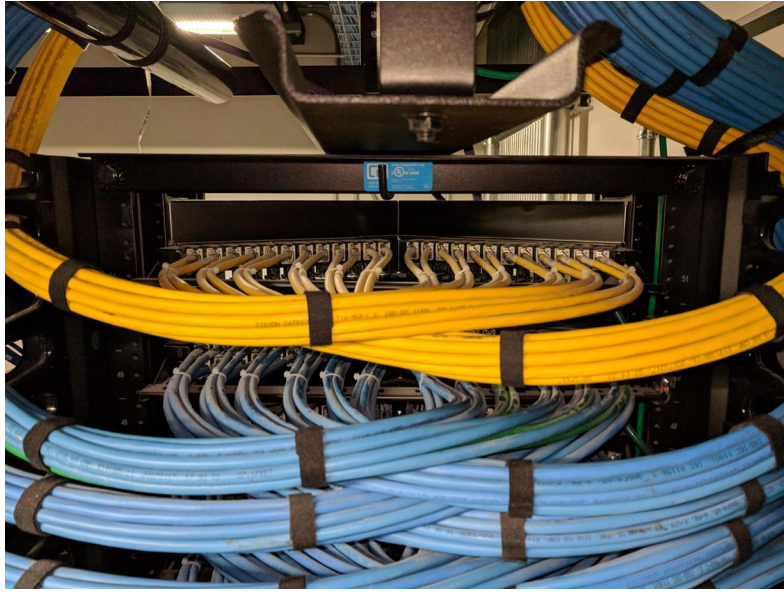
## 2.1 APPROVED PRODUCT

- A. PATCH PANELS – COPPER
  - 1. 48 Port CAT 6A Shielded, 1RU Angled Patch Panel with Outlets – Siemon Z6AS-PA-48A
  - 2. 48 Port CAT 6A Shielded, 1RU Flat Patch Panel with Outlets – Siemon Z6AS-PNL-U48K
  - 3. 24 Port CAT 6A Shielded, 1RU Flat Patch Panel with Outlets – Siemon Z6AS-PNL-U24K
  - 4. 48 Port CAT 5e, 2RU Angled Patch Panel, 110 Style – Siemon HD5-48A
  - 5. 48 Port CAT 5e, 2RU Flat Patch Panel, 110 Style – Siemon HD5-48
  - 6. 24 Port CAT 5e, 1RU Angled Patch Panel, 110 Style – Siemon HD5-24A
  - 7. 24 Port CAT 5e, 1RU Flat Patch Panel, 110 Style – Siemon HD5-24
  - 8. 19" Angled Blank Filler Panel, 1U, Black – Siemon PNL-BLNKA-1
    - a. Provide blank fillers where appropriate.
  - 9. 19" Flat Blank Filler Panel, 1U, Black – Siemon PNL-BLNK-1
    - a. Provide blank fillers where appropriate.
- B. PATCH PANELS – FIBER
  - 1. Rack Mount Fiber Enclosure – Siemon RIC3-48E-01
  - 2. Wall Mount Fiber Enclosure – Siemon SWIC3G-AA-01
  - 3. Blank Adapter Plate, Black – Siemon RIC-F-BLANK-01
  - 4. 12F-LCUPC-SM-Loaded-Splice Cassette - Siemon – RSC12-LCUSMA-B1
- C. CABINET PATCH PANEL – FIBER
  - 1. Lightstack Surface Mount Module Enclosure – Siemon – LSE-01
  - 2. Lightstack Surface Mount Splice Enclosure – Siemon – LSS-01
  - 3. Lightstack LC Adapter Plate – Siemon LS-LS12-01C-AQ

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. For angled patch panels, the terminations shall cross in the back to the opposite path of the patch panel to maximize available cable bend radius.
- B. See illustration below in this section:



END OF SECTION



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**SECTION 271300****BACKBONE CABLING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
- B. Section 27 05 28 – Pathways for Communications Systems.

**1.2 DEFINITIONS**

- A. **INTRA-BUILDING CABLING**
  - 1. Cable that runs between telecommunications rooms (TRs) inside a building. Can be vertical or horizontal in physical orientation. It consists of the backbone transmission media between these locations and the associated connecting hardware terminating this media.
- B. **INTER-BUILDING / CAMPUS CABLING**
  - 1. Cable that runs between buildings in a campus environment. It is normally a first-level backbone cable beginning at the main cross-connect in the equipment room of the hub building and extending to the intermediate cross-connect in the equipment room of a satellite building. Campus Backbones require optical fiber cable to be installed to support high speed data applications.
  - 2. Customer owned outside plant (OSP) cabling.

**PART 2 - PRODUCTS****2.1 PERMITTED BACKBONE MEDIA**

- A. Cables allowed for use in the backbone include:
  - 1. CAT 6A F/UTP Riser, Blue, Data – Siemon 9A6R4-A5-06-R1A
  - 2. CAT 6A F/UTP Plenum, Blue, Data – Siemon 9A6P4-A5-06-R1A
  - 3. 50 Pair Category 3 Riser Cable Gray – General Cable 2133161 or equal
  - 4. Fiber Optic Cable, Single-mode, 24 Strand, Armored Indoor/Outdoor Cable, Black – Siemon 9BG8P024L-E201A
  - 5. Fiber Optic Cable, Single-mode, 24 Strand, Armored, Plenum Cable, Yellow – Siemon 9BC8P024L-205A
  - 6. Fiber Optic cable, Multi-mode, OM4, 12 Strand, Armored, Plenum Cable, Aqua – Siemon 9BC5P012G-T512A (Data Centers must be OM4 or better)
- B. The cable shall support voice, data and imaging applications. The bending radius and pulling strength requirements of all backbone cables shall be observed during handling and installation.
- C. Multi-pair twisted pair cable is intended to support analog voice applications and shall be tested for continuity only.
- D. In addition to meeting the applicable performance specifications, all copper and optical fiber cable shall be appropriate for the environment in which it is installed.

**2.2 MEDIA PRODUCTS**

- A. **COPPER**

1. The total channel length between the Campus Distributor/Main Cross-connect and to any floor Distributor/Horizontal Cross-connect shall not exceed the following length limits for copper cabling:
  - a. 2,000 m (6,560 ft) for balanced twisted pair for PBX/Class A (100 kHz) applications.
  - b. 200 m (656 ft) for balanced twisted pair for Class B ( $\leq$  1 MHz) applications.
  - c. 100 m (328 ft) for balanced twisted-pair categories 6, 6A & 7 (per Backbone segment when providing a two-level Backbone).
- B. MULTIMODE OPTICAL FIBER
  1. See Siemon website for supportable fiber distances
    - a. Laser qualified 50/125 $\mu$ m multimode fiber optical fiber cables shall be in compliance with the following standards ISO/IEC 11801:2002 OM3, ANSI/TIA-568-C.3, ANSI/TIA-568-C.1 and Telcordia GR-409-CORE as well as the guaranteed application distances, attenuation, bandwidth, and group index of refraction requirements.
    - b. Specifications:
      - 1) Shall support 10GBASE-SX for all horizontal workstations, risers and short length backbone (<300 m) locations.
      - 2) Constructed for overfilled launch (OFL) and restricted mode launch (RML) bandwidth to ensure compatibility with both LED and laser light sources.
      - 3) Have an Aqua Outer Jacket and be available in cable ratings including OFNR and OFNP.
- C. SINGLE MODE OPTICAL FIBER
  1. See Siemon website for supportable fiber distances
  2. Single-mode optical fiber cable shall be used for 1st and 2nd Level Backbone applications only.
  3. All fiber is to fusion spliced terminations.

### PART 3 - EXECUTION

#### 3.1 TOPOLOGY

- A. The Backbone cabling shall use a conventional hierarchal star topology.
  1. There shall be no more than two (2) levels of cross-connects between the campus distributor/main cross –connect (CD/MC) and any given floor distributor/horizontal cross-connect (FD/HC).
  2. From the FD/HC no more than one cross-connect shall be passed through to reach the CD/MC.
- B. Splicing of UTP, F/UTP and S/FTP copper cables is not permitted.

#### 3.2 TYPICAL TDR BACKBONE

- A. A typical TDR backbone for a hospital campus shall consist of:
  1. Redundant (2 ea.) 24 strand single-mode fiber each routed in a separate path.
  2. One 50 pair copper feed line.

END OF SECTION

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**SECTION 271500****HORIZONTAL CABLING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
- B. Section 27 05 28 - Pathways for Communications Systems

**1.2 SUMMARY**

- A. This section includes requirements and guidelines for the installation of F/UTP, ScTP, and Fiber horizontal cabling.
  - 1. Horizontal cable and its connecting hardware provide the means of transporting signal between the telecommunications outlet/connector and the horizontal cross-connect located in the communications termination room. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.

**PART 2 - EXECUTION****2.1 HORIZONTAL CABLE**

- A. Quantity
  - 1. Two horizontal cables shall be routed to each work area. Cable connected to information outlets shall be CAT6A F/UTP, 4-pair, 100Ω balanced twisted-pair.
    - a. A work area is approximately 100 sq. ft. and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
    - b. Two (2) standard cables shall be run to each wireless access point location per current best practice.
    - c. One (1) standard horizontal cable may be run to the following locations:
      - 1) Each building control system enclosure as directed by the building controls vendor.
      - 2) Each IP Video Surveillance Camera at each of the designated locations.
      - 3) Each wall phone.
      - 4) Each wall monitor/display.
  - 2. For voice or data applications, 4-pair balanced twisted-pair or fiber optic cables shall be run using a star topology from the telecommunications room serving that floor to every individual information outlet. The customer prior to installation of the cabling shall approve all cable routes.
  - 3. Installation interfaces shall be T568B wiring standards.
- B. Maximum Length
  - 1. All horizontal cables, regardless of media type, shall not exceed 90 m (295 ft.) from the telecommunications outlets in the work area to the Floor Distributor/Horizontal Cross connect (FD/HC) located in the Telecommunication Room.
  - 2. Distributor/Horizontal Cross connect (FD/HC) located in the Telecommunication Room.
  - 3. The combined length of jumpers, patch cords inclusive of equipment cables in the Floor Distributor/Horizontal Cross-connect shall not exceed 5m (16 ft.).

4. The maximum length of Work Area equipment cables shall be 5m (16 ft.) If a MuTOA (Multiple User Telecommunication Outlet) environment exists, then the maximum equipment cable shall not exceed 22m (72 ft.) (Lake Park Facility)
  5. Terminate all conductors; no cable shall contain un-terminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
- C. Minimum Length
1. It is recommended that a minimum horizontal cable distance of 15m (49 ft.) shall be maintained between the telecommunications room and the work area. This will provide adequate Insertion Loss/Attenuation for applications over 1 Gig.
  2. For installations with consolidation points, a minimum horizontal cable distance of 15m (49 ft.) shall be maintained between the telecommunications room and consolidation point, and 5m (16 ft.) between the consolidation point and the work area. This will provide adequate Insertion Loss/Attenuation for applications over 1 Gig.
- D. Splice Free
1. Each run of balanced twisted-pair cable between Floor Distributor/Horizontal Cross-connect in the telecommunication room and the information outlet at the Work Area shall not contain splices.
  2. Bridged taps and splices shall not be installed in the horizontal cabling
- E. Protection
1. Horizontal distribution cables shall not be run in under slab raceways that are damp or wet locations unless suitably rated for the environment.
    - a. Under slab conduits that are outside of the building are considered wet locations.
- F. Slack -Service Loop – Routing
1. In the work area, a minimum of 1m (3 ft) should be left for balanced twisted-pair cables and fiber cables.
  2. In telecommunications rooms a minimum of 3m (10 ft) of slack should be left for all cable types. This slack must be neatly managed on trays or other support types

## 2.2 SEPARATION

- A. Separation from EMI sources
1. Installation shall comply with BICSI TDMM and TIA/EIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
  2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and EMI Source shall be as follows:
    - a. EMI Source Rating Less Than 2 kVA: A minimum clearance of 5 inches.
    - b. EMI Source Rating between 2 and 5 kVA: A minimum clearance of 12 inches.
    - c. EMI Source Rating More Than 5 kVA: A minimum clearance of 24 inches.
  3. Separation between communications cables in grounded metallic raceways and unshielded power lines or EMI Source shall be as follows:
    - a. EMI Source Rating Less Than 2 kVA: A minimum clearance of 2-1/2 inches.
    - b. EMI Source Rating between 2 and 5 kVA: A minimum clearance of 6 inches.
    - c. EMI Source Rating More Than 5 kVA: A minimum clearance of 12 inches.
  4. Separation between communications cables in grounded metallic raceways and power lines and EMI Source located in grounded metallic conduits or enclosures

shall be as follows:

- a. EMI Source Rating Less Than 2 kVA: A minimum clearance of 2 inches.
  - b. EMI Source Rating between 2 and 5 kVA: A minimum clearance of 3 inches.
  - c. EMI Source Rating More Than 5 kVA: A minimum clearance of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 1 HP and Larger: A minimum clearance of 48 inches.
  6. Separation between Communications Cables and Fluorescent Fixtures: A minimum clearance of 5 inches
- B. Other Clearances
1. Horizontal pathways used for telecommunications cabling shall be dedicated for telecommunications use and not shared by other building services.
  2. In a false ceiling environment, a minimum of 75 mm (3 in) shall be observed between the cable supports and the false ceiling.

## 2.3 PATHWAY

- A. Cable Tie Wraps
1. Cable Tie Wraps are not permitted as a pathway device or support.
  2. Tie Wraps shall only be used to provide strain relief at termination points.
  3. Tie wraps shall not be over tightened to the point of deforming or crimping the cable sheath.
- B. Constraints
1. Horizontal cables shall be installed in "dry" locations that provide protection from moisture levels above the intended operating range of inside plant (ISP) cables.
    - a. If cabling is intentionally or unintentionally exposed to water or otherwise coated with or exposed to direct contact with solvents, paints, adhesives, sealants or other third-party materials, Siemon will not warranty the cabling product or if after the warranty has been issued, it would become void. Therefore, any cabling that has been exposed as listed above, must be removed and replaced.
  2. Horizontal pathways shall be installed or selected such that the minimum bend radius of horizontal cables is kept within manufacturer specifications both during and after installation.
  3. A minimum of a 1" diameter conduit is recommended for new construction. Existing conduits will require the reduction of the number of cables placed in the conduit to meet the required fill ratio.
    - a. The Contractor shall observe the bending radius and pulling strength requirements of the 4-pair balanced twisted-pair and fiber optic cable during handling and installation.
      - 1) 4-Pair UTP, F/UTP, S/FTP bend radius = 4 times outside diameter of cable under no-load conditions. 8 times the outside diameter under load (pulling 110 N/25 lbf.) conditions.
      - 2) Multi-pair or Hybrid cable bend radius = 10 times the outside diameter under all conditions.
      - 3) 2-Fiber and 4 Fiber cables bend radius = 25mm (1 in.) under no-load conditions. 50mm (2 in.) under load (pulling 222 N 50 lbf)
  4. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
  5. Cable that passes through non-Intermountain Healthcare spaces must be installed in conduit.
  6. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
  7. Do not install bruised, kinked, scored, deformed, abraded cable or otherwise damaged cable. Do not splice cable between termination, tap, or junction points.

Remove and discard cable if damaged during installation and replace it with new cable.

8. During Cold-Weather Installation, bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.

C. Capacity

1. The number of horizontal cables placed in a cable support or pathway shall be limited to the number of cables that will not alter the geometric shape of the cables.
2. Maximum pathway (cable tray/basket tray/wireway) capacity shall not exceed a calculated fill ratio of 50% to a maximum of 75 mm (3 in) inside depth.
3. Maximum conduit pathway capacity shall not exceed a 40% fill. However, perimeter and furniture fill are limited to 60% fill for move and changes. A 40% fill ratio is the maximum fill for CAT6A F/UTP cables.
4. All unused cables shall be removed
  - a. Or labeled at both ends designating future purpose and locations of each end.

END OF SECTION

## SECTION 271513

## COPPER CABLE

## 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 PALLETTE

- A. Color palette shall be in accordance with Section 27 05 53

## 1.3 SUMMARY

- A. This Section covers approved F/UTP cable types
- B. Systems shall be CAT6A F/UTP unless a written deviation has been approved.
- C. CAT6A UTP and CAT6A F/UTP shall not be mixed on the same campus.
- D. This cable shall be used for both voice and data applications and shall be plenum rated where required by code

## PART 2 - PRODUCT

## 2.1 APPROVED PRODUCT

- A. TYPE 6A F/UTP (foil over unshielded twisted pair) - Siemon
  - 1. CAT 6A F/UTP Riser, (CMR) – Siemon 9A6R4-A5-(XX)-R1A
  - 2. CAT 6A F/UTP Plenum, (CMP) – Siemon 9A6P4-A5-(XX)-R1A
    - a. (XX) = Color – 06, Blue – 05, Yellow – 09, Orange

END OF SECTION

## SECTION 271543

## FACEPLATES AND CONNECTORS

## 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 DEFINITION

- A. Work-Area Cabling
  - 1. The work area is comprised of work area outlet/connectors, faceplates, outlet boxes and equipment cords. It acts as the interface to the horizontal cabling from the horizontal cross-connect (HC) to telephone, network equipment, wireless access points (WAP) and OIP devices.

## PART 2 - PRODUCT

## 2.1 OUTLETS

- A. Category 6A Jack – Siemon Z6A-S(XX)
  - 1. Use (XX) to specify color.
  - 2. Universal design allows the same outlet to be mounted in a flat or angled orientation.
- B. Category 6A Z-Plug WO Latch Protector – Siemon ZP1-6AS-(00)S
- C. Voice Outlet, Single Gang Faceplate, White W/Wall Hung Phone W/6A Insert – Siemon MX-WP-Z6AS-SS

## 2.2 FACEPLATES/BOXES

- A. 10G Single Gang Faceplate, White, 4 Position – Siemon 10GMX-FP-04-02
- B. MAX Single Gang Faceplate, White – Siemon MX-FP-S-(XX)-02
  - 1. USE (XX) to specify the number of ports.
- C. MAX Single Gang Faceplate, Stainless Steel, 4 Position, with Label Holder – Siemon MX-FP-S-04-SS-L
  - 1. To be used in the Operation Rooms
- D. Surface Mount Box, White, 2 Position – Siemon MX-SMZ2-02
- E. Furniture Faceplate, Black – Siemon MX-UMA-01
- F. Conference Room Table Inserts shall include an HDMI port.

## PART 3 - EXECUTION

## 3.1 WORK AREA TERMINATION

- A. All balanced twisted-pair cables wired to the telecommunications outlet/connector, shall have 4-pairs terminated in eight-position modular outlets in the work area. All pairs shall be terminated.
- B. Outlet/connector back boxes shall be a minimum 4-11/16 square box (4-11/16" x 4-11/16" x 3") with a minimum single gang 5/8" mud ring for new construction to accommodate the CAT6A connectors.



- C. Existing back boxes will require a faceplate stand-off and/or a faceplate that can accommodate a bezel to extend the CAT6A jack out to allow the installation of the CAT6A connectors.
- D. All outlets need to be installed in the angled position.

END OF SECTION

## SECTION 271619

## PATCH CABLES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This section is issued as a guide for patch cable installations in the Data Center, wiring closets (TDR) and user areas where patch cables are required for connectivity to IP and TDM phones, and IP data connectivity needs for Intermountain Healthcare. All patch cables will support voice, data, and imaging applications within the Intermountain Healthcare Enterprise.

## PART 2 - PRODUCTS

## 2.1 APPROVED PRODUCT

- A. Patch Cable, CAT 6A Shielded - Siemon SP6A-S (XX)-(XX)  
1. Use 1<sup>st</sup> (xx) to specify length. Use 2<sup>nd</sup> (xx) for color.
- B. Patch Cable, CAT 5e, Orange – Siemon MC5-(XX)-0909  
1. Use (xx) to specify length. For use with NURSE CALL only.
- C. Patch Cable, CAT 5e, White – Siemon MC5-(XX)-0202  
1. Use (xx) to specify length.  
2. For use in the TEC for the Copper Backbone Patch only.
- D. Patch Cable, Fiber, Singlemode Duplex W/LC Connectors, Yellow – Siemon FJ2-LCULCUL-(xx)  
1. Use (xx) to specify length.
- E. Patch Cable, Fiber, Multimode Duplex W/LC Connectors, Aqua – Siemon FJ2-LCLC5V-(xx)AQ  
1. Use (xx) to specify length. For use in the Data Center.

## PART 3 - EXECUTION

## 3.1 PALLETTE

- A. Patch Cable Color Codes  
1. The Intermountain Healthcare Enterprise standard for patch cable color is in Section 27 05 53.  
2. The patch cable color shall match the feed cable color to identify the service provided.
- B. Contractor furnished  
1. All patch cables for the TEC, TDR's shall be included in the low voltage contract and will be required to match or exceed the existing level of the installed structured cabling system.  
2. All patch cables for the user areas shall be Owner furnished and will be required to match or exceed the existing level of the installed structured cabling system.  
3. All patch cables shall be Owner installed.  
4. The quantity of patch cables to be provided by the low voltage contractor shall be specified in the plans.  
a. 50% 5ft – 30% 7ft – 15% 10ft – 5% 15ft

END OF SECTION

## SECTION 275113

## OVERHEAD PAGING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. The Primary Division 27 subcontractor shall be accountable to closely coordinate the Overhead Paging system with the General Contractor.
  - 1. Division 27 is accountable for including the cabling, equipment, and installation thereof in their work; based upon the project drawings.
- B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- C. Requirements of the following Division 26 Sections apply to this Section:
  - 1. Basic Electrical Requirements.
  - 2. Basic Electrical Materials and Methods.

## 1.2 SUMMARY

- A. This Section includes the installation of an overhead paging system that shall be accessible through the telephone system. It includes requirements for paging system components including, but not limited to, the following:
  - 1. Speaker systems.
  - 2. Wiring
- B. This section requires that rough-in materials for this section be provided by the Division 26 installer for installation under Division 26. Rough-in materials include but are not limited to conduit, junction boxes, alternative raceway, and device enclosures. Cable for this section is to be provided by the Division 27 installer.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (for each type of product) as listed in the drawings and these specifications:
  - 1. Atlas Sound
  - 2. Bogen
  - 3. Quam

## 2.2 SYSTEM REQUIREMENTS

- A. General: Provide complete and fully functional overhead paging systems using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction in accordance with published product information. Coordinate the features of materials and equipment so they form an integrated system with components and interconnections matched for optimum performance of specified functions.

## 2.3 EQUIPMENT AND MATERIALS

- A. General: Provide all solid-state components fully rated for continuous duty at the ratings indicated or specified. Select equipment for normal operation on input power supplied at 105-130 V, 60 Hz.
- B. Loudspeakers shall be an 8" dual cone type with a 10-ounce, ceramic magnet. Power handling rating shall be 5 watts continuous with a sensitivity of 94 dB at 1 meter/1 watt and frequency response of +/- 5 dB from 80 to 15,000 Hz. The speaker shall have an impedance of 8 ohms and be equipped with a 70-volt matching transformer with power taps from 0.5 to 4 watts. Recessed ceiling mounted speaker assemblies shall mount on an Atlas Sound T720-8-A or similar baffle on a T95-8 series or similar enclosure.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the Overhead Paging System work.
- B. Do not proceed until unsatisfactory conditions have been corrected.
- C. Verify compliance of the following items before beginning sound equipment installation.
  - 1. No cables spliced except at standard barrier terminal blocks inside equipment cabinet.
  - 2. Cables marked at each end with permanent wire labels such as Brady or equal.
  - 3. Isolated ground run back to main electrical panel from paging equipment cabinet.
  - 4. Specified conduit, cables, speaker enclosures and equipment cabinets are properly installed.

#### 3.2 INSTALLATION

- A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
- B. Speakers:
  - 1. Confirm polarity of speaker before installation and wire to maintain uniform polarity.
  - 2. Mount transformers with screws securely to speaker brackets or enclosures.
  - 3. Neatly mount speaker grilles, panels, connector plates, etc., tight, plumb, and square unless indicated otherwise on drawings.
  - 4. Provide brackets, screws, adapters, springs, rack mounting kits, etc., recommended by manufacturer for correct assembly and installation of speaker assemblies and electronics components.
  - 5. Identification:
    - a. Legibly identify user operated system controls and system input/output jacks using engraved, permanently attached laminated plastic plates or imprinted Lexon labels. Label equipment and controls within equipment cabinet using similar labels or "Kroy" type labels.
- C. Repairs: Wherever walls, ceilings, floors, or other building finishes are cut for installation, the contractor shall be responsible to repair, restore, and refinish to original appearance.

#### 3.3 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 the pre-testing, testing, and adjustment of the system.
- B. Pre-testing: Upon completing installation of the system, align, adjust, and balance the system and perform a complete pretest. Determine the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed. Replace

malfunctioning or damaged items with new, and retest until materials satisfactory performance and conditions are achieved.

3.4 COMMISSIONING

- A. Occupancy Adjustments: When requested by the Architect or the Sound/Acoustical Consultant within one year of date of substantial completion, provide on-site assistance in adjusting sound levels, resetting matching transformer taps, and adjusting controls to suit actual occupied conditions. Provide two trips for this purpose.

3.5 CLEANING AND PROTECTION

- A. Prior to final acceptance, clean system components and protect from damage and deterioration.

END OF SECTION

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SECTION 275319

INTERNAL CELLULAR, PAGING  
AND ANTENNA SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of the following Division 26 Sections apply to this Section:
  - 1. Basic Electrical Requirements.
  - 2. Basic Electrical Materials and Methods.

1.2 SUMMARY

- A. The DAS system is provided and installed as an Owner-provided, Owner installed (OFOI) system by a 3<sup>rd</sup>-party vendor, contracted and managed by Intermountain CTIS/Telecom Team.
- B. A/E to coordinate DAS requirements with the Owner's vendor to incorporate necessary infrastructure on their drawings to support a fully functional DAS system.

PART 2 - EXECUTION

2.1 INSTALLATION

- A. DAS contractor is to install their equipment located in the TDRs in the assigned rack location as noted in the ET Rack Elevation Drawings.
- B. DAS contractor is to install any wall mounted equipment in the TDRs in the assigned location as noted in the ET TDR Room Elevation drawings.
- C. Specific power requirements will need to be provided in the design phase of the project by the CTIS/Telecom team.
- D. Cable installation will follow Division 27 installation specifications.

END OF SECTION

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**SECTION 276001****APPENDIX 01 – DEVIATION  
REQUEST PROCESS****PART 1 - GENERAL****1.1 DEFINITIONS**

- A. Cable Plant Deviation
  - 1. A business need to not fully comply with the requirements of the “Division 27 – Communications and Structured Cabling Specification document”
- B. Cable Plant Deviation Request form.
  - 1. The document is available from the Facilities Planning team, the Data Center Ops team, or the Infrastructure Cabling team.
  - 2. Usage:
    - a. The deviation request form shall be used if there is a business need to not comply with the requirements of the “Division 27 – Communications and Structured Cabling Specification document”
    - b. The deviation request form should also be used to propose a change to that document. Always verify that you are using the current version of the Standard before requesting a modification.

**PART 2 - PROCESS****2.1 STANDARDS MODIFICATION**

- A. Check the box and explain why the standard should be modified.

**2.2 ALTERNATE PRODUCT**

- A. The deviation form must be completed, submitted through channels, and approved prior to any deviation from the specifications. This includes issuing change orders.

**2.3 AUTHORIZED SIGNATURES**

- A. Both the Standards Holder and the DCO Manager signatures are required for a deviation to be valid.

**2.4 DEVIATION REVIEW PROCESS STEPS**

- A. First be sure that there is an actual need. Then be certain that your manager, supervisor, or project manager agrees with the requested deviation. Be sure to state this or obtain their signature on the deviation form. By doing so you are confirming that your supervisor or project manager has approved.
- B. The requestor will then complete sections 1, 2, and 3 of the deviation form.
  - 1. The requestor should then digitally sign in the designated location at the end of Section 3. Do not write in the sections below 3.
- C. Forward the saved copy of this form to the Standards Holder via email.
  - 1. Email to: [melissa.lopez2@imail.org](mailto:melissa.lopez2@imail.org)
- D. The Standards Holder will then review and evaluate the request. The requestor should be prepared to provide plans, specifications, and competitive bids if requested. Any email threads or meeting discussions regarding the issue will be taken into consideration.

- E. The Standards Holder will then cast an Approve or Deny vote and forward the request to the DCO Manager for a decision.
- F. When the decision has been made by the Operations Manager, the Standards Holder will then notify the requestor by returning the completed and signed form via email.
- G. An approved deviation will have the final disposition button 'Approved' and be signed by at least 2 people. One will be from the Standards Holder, and the other the DCO Manager. Other signatures may be required for specific features and areas such as Safety, Security, Print, Medical group, etc.

### PART 3 - EXECUTION

#### 3.1 POST DECISION EXECUTION

- A. DENIED
  - 1. If the requester is not satisfied with the decision, they may file an appeal with the Data Center Operations manager (shawn.folkman@imail.org), who will then escalate the issue to the appropriate business leaders as needed. The decision from the appeal is final.
- B. APPROVED
  - 1. If a deviation is approved for contracted material, labor, or method; the facilities project manager will arrange for fulfillment or contract adjustment as needed via appropriate contract channels such as change orders.

END OF SECTION



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SECTION 276002

APPENDIX 02 – DOCUMENT  
REFRESH PROCESS

PART 1 - GENERAL

1.1 NOT USED

PART 2 - PRODUCTS

2.1 APPROVED PRODUCT

- A. The purpose of this section is to help ensure a current standards document.
- B. The product delivered will be a current revision or version of the Cable Plant Standards Document.
- C. All changes must be approved by Enterprise Infrastructure Cabling team.

PART 3 - EXECUTION

3.1 REVIEWS AND UPDATES

- A. Minor updates
  - 1. Changes that do not significantly affect scope of work, or contract pricing will be made, and the Rev number will be updated. (i.e. updated part numbers, etc.)
  - 2. Significant changes will be added to the Change Log for review and approval from the DCO/Infrastructure Cabling Team.
    - a. When approved, they will be submitted for approval; and then implemented in the new Version.
- B. Major updates
  - 1. The DCO/Infrastructure Cabling Team will review the entire document at least once every three years.
  - 2. This review will coincide with the release of new versions of NFPA70 (National Electrical Code) (2017, 2020, etc. - to be completed by the end of each designated year).
  - 3. The review will cover standards adjustments that may be deemed necessary and ensure compliance with applicable codes and standards.
  - 4. Upon completion of the reviews and updates, the standards document will be submitted for approval.

END OF SECTION

## SECTION 276003

## APPENDIX 03 – DATA CENTER, TEC, TDR PART NUMBERS

ITEM	MANUFACTURER	PART NO.	DESCRIPTION
Blanking Panel	Upsite Hotlok	10031	Blanking Panel 1U
Blanking Panel	Upsite Hotlok	10033	Blanking Panel 2U
UPS	Eaton	9PX1500R	Eaton Powerware 9PX-1500V
UPS Network Card	Eaton	NETWORK-M	Card for 9PX-1500VA
PDU	Eaton	ePBZ79	Horizontal Mount ePDU 208vac
PDU	Eaton	ePBZ82	Horizontal Mount ePDU 120vac
PDU	Server Technology	C1S24VS-YCFA13C9	Vertical 30A PDU (Blue) for TEC
PDU	Server Technology	C1L24VS-YCFA13C9	Vertical 30A PDU (Red) for TEC
PDU	Server Technology	C2SG36TE-YCMFAM66/C	Vertical 30A PDU (Blue) for Data Centers
PDU	Server Technology	C2LG36TE-YCMFAM66/C	Vertical 30A PDU (Red) for Data Centers
PDU	Server Technology	C2SG36TE-DQME2M66/ZB	Vertical 60A PDU (Blue) for Data Centers
PDU	Server Technology	C2LG36TE-DQME2M66/ZR	Vertical 60A PDU (Red) for Data Centers
UPS	Eaton	K41512000000000	Eaton 9155-15kVA UPS
Modbus Card	Eaton	103005425-5591	Eaton Modbus Card X-Slot
Reverse Transfer UPS System	Eaton	9GPV15C0009E00R2	Eaton 93PM-150kW Reverse Transfer UPS System
CRAC Cooling Unit	Liebert	DE363G	
Vertical Wall Mount Cabinets	Legrand	VWMSD-4RU-42-B	42" 12" 4RU Fixed
Vertical Wall Mount Cabinets	Legrand	VWMSD-8RU-42-B	42" 18" 8RU Fixed
Rail Accessories	Legrand	VWM-RR-4RU	Fixed Mounting Rail Kit, 4RU
Rail Accessories	Legrand	VWM-RR-8RU	Fixed Mounting Rail Kit, 8RU
Rail Accessories	Legrand	VWM-PIV-4RU	Pivoting Mounting Rail Kit, 4RU
Fan Kit	Legrand	VWMFK-115	VWM Fan Kit w/115 VAC Fans (includes 2 fans and mounting hardware) (2 kits needed for 8RU cabinet)
VWM Top Brush Grommet Kit	Legrand	VWMBGK	VWM Top Brush Grommet Kit
Circular Knockout Grommet Kit	Legrand	VWMGR-30	Circular Knockout Grommet Kit
Vertical Wall-Mount Cabinets	Hubbell	IR221APG	Refrigerated cabinet 24"
Vertical Wall-Mount Cabinets	Hubbell	IR321APG	Refrigerated cabinet 36"
Vertical Wall-Mount Cabinets	Hubbell	IR421APG	Refrigerated cabinet 48"
Air Conditioners	Hubbell	IRAC1	Air conditioner for Hubbell refrigerated cabinets
Cylinder	Medeco	100500 G	1 ¼" Mortise Cylinder
Cylinder	Medeco	100400H G	Rim Cylinder, Horizontal Tailpiece
Cylinder	Medeco	EA-100108	Small Format Interchangeable Core (SFIC) Cylinder
Cylinder	Medeco	20200S1 G	Cylinder Package for Schlage

Cam Lock	Medeco	EN-150002-219	7/8" Cam Lock Assembly, Key Retaining
Cam Lock	Medeco	EN-150003-219	1 1/8" Cam Lock Assembly, Key Retaining
Cylinder for Legrand cabinet front door	Medeco	232301S 800 G	Modular Profile Cylinder – 30mm Half Profile - Assembled
Electronic Key	Medeco	94-0271	Medeco Slim Line Key (G2) & Charger Bundle
Programming Station for Small Locations	Medeco	EA-100109	Medeco XT Desktop USB Programming Station (not preferred)
Programming Station for Large Locations	Medeco	EA-100158	Medeco XT Wall USB Programming Station (preferred)
Wall Mount for Wall Programmer	Medeco	94-0294	Medeco XT Remote Wall Programmer Wall Mount Kit
Padlock for use with Electronic Cylinder	Master	6842D045KZ	Padlock
Red C20 C19 Dual Lock 12 gauge 6'	Stay Online	5914	Red C20 C19 Dual Lock 12 gauge 6'
Blue C20 C19 Dual Lock 12 gauge 6'	Stay Online	6766	Blue C20 C19 Dual Lock 12 gauge 6'
Red C14 Locking C15 Notched 14 gauge 6'	Stay Online	9144	Red C14 Locking C15 Notched 14 gauge 6'
Blue C14 Locking C15 Notched 14 gauge 6'	Stay Online	9138	Blue C14 Locking C15 Notched 14 gauge 6'
Red C14 C13 Dual Lock 18 gauge 6'	Stay Online	5656	Red C14 C13 Dual Lock 18 gauge 6'
Blue C14 C13 Dual Lock 18 gauge 6'	Stay Online	6694	Blue C14 C13 Dual Lock 18 gauge 6'

## SECTION 276004

## APPENDIX 04 – REFERENCE STANDARDS

## PART 1 - GENERAL

## 1.1 REFERENCE STANDARDS

- A. Codes and Standards (Most recent editions with addenda/TSB, etc.) All materials, installation and workmanship shall meet or exceed the applicable requirements and standards addressed within the references listed below:
1. ANSI/TIA-568.0-D and addenda "Generic Telecommunications Cabling for Customer Premises
  2. ANSI/TIA-568.1-D and addenda "Commercial Building Telecommunications Cabling Standard
  3. ANSI/TIA-568.2-D and addenda "Balanced Twisted-Pair Telecommunications Cabling and Components
  4. ANSI/TIA-568.3-D and addenda "Optical Fiber Cabling Components Standard"
  5. ANSI/TIA-568.4-D and addenda "Broadband Coaxial Cabling and Components Standard"
  6. ANSI/TIA-569-D and addenda "Telecommunications Pathways and Spaces"
  7. ANSI/TIA-606-C and addenda "Administration Standard for Commercial Telecommunications Infrastructure"
  8. ANSI/TIA-607-D and addenda "Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises"
  9. ANSI/TIA-758-B "Customer-Owned Outside Plant Telecommunication Infrastructure Standard"
  10. IEEE 802.3at PoE Plus and Next Gen PoE CFI March 2013 and IEEE P802.3ba latest draft revision and amendments.
  11. "Media Access Control Parameters, Physical Layers and Management Parameters for 40 Gbp/s and 100 Gbp/s Operation".
  12. ANSI/TIA-526-7-A "Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant"
  13. ANSI/TIA/EIA-526-14-C "Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant"
  14. ANSI/TIA-942-B "Telecommunications Infrastructure Standard for Data Centers"
  15. ANSI/TIA – 1179-A "Healthcare Facility Telecommunications Infrastructure Standard"
  16. IEC/TR3 61000-5-2 - Ed. 1.0 and amendments "Electromagnetic compatibility (EMC) - Part 5: Installation and mitigation guidelines - Section 2: Earthing and cabling"
  17. ISO/IEC 11801-1 (2017) and amendments "Information technology - Generic cabling for customer premises – PART 1: General Requirements"
  18. EN 50173-1 and amendments "Information Technology - Generic cabling systems – PART 1 General Requirements"
  19. AIA Guidelines for Design and Construction of Hospital and Healthcare Facilities
  20. Construction Specification Institute Master Format
  21. BICSI: Comply with the most current editions of the following BICSI manuals:
    - a. BICSI - Telecommunications Distribution Methods Manual
    - b. BICSI – Installation Transport Systems Information Manual
    - c. BICSI – Network Design Reference Design Manual
    - d. BICSI – Outside Plant Design Reference Manual
    - e. BICSI – Wireless Design Reference Manual

- f. BICSI -Electronic Safety and Security Design Reference Manual
- g. Infocomm/BICSI – AV Design Reference Manual
- 22. Underwriters Laboratories (UL) Cable Certification and Follow-Up Program.
- 23. National Electrical Manufacturers Association (NEMA)
- 24. American Society for Testing Materials (ASTM)
- 25. National Electrical Code (NEC) NFPA70 2020
- 26. National Electrical Safety Code (NESC) 2017
- 27. Institute of Electrical and Electronic Engineers (IEEE)
- 28. UL Testing Bulletin
- 29. Building Industry Consulting Services International (BICSI) Information Transport Systems Methods Manual (ITSMM)
- 30. Local, county, state and federal regulations and codes in effect as of date of installation.
- 31. Equipment of foreign manufacture must meet U.S. codes and standards. It shall be indicated in the proposal the components that may be of foreign manufacture, if any, and the country of origin.

END OF SECTION

## SECTION 276005

## APPENDIX 05 – DEFINITIONS AND ABBREVIATIONS

## PART 1 - GENERAL

## 1.1 RELATED TERMS

- A. Codes and Standards (Most recent editions with addenda/TSB, etc.) All materials, installation and workmanship shall meet or exceed the applicable requirements and standards addressed within the references listed below:
1. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
  2. BICSI: Building Industry Consulting Service International.
  3. CBC: Coupled Bonding Conductor
  4. CFCI: Customer Furnished Customer Installed
  5. Cable Run - A single cable to a single location
  6. Cable Drop - Two cables to a single location
  7. Cable Tri Drop - Three cables to a single location
  8. CT Coupler A type of wall connector made by the Siemon Company
  9. DCO: Data Center Operations
  10. Div. 1: Division 1 General and Performance Requirements
  11. Div. 23: Division 23 Heating, Ventilating, and Air Conditioning
  12. Div. 22: Division 22 Plumbing
  13. Div. 26: Division 26 Electrical
  14. Div. 27: Division 27 Communications and Audio Visual
  15. Div. 28: Division 28 Electronic Safety and Security
  16. E.E.: Electrical Engineer
  17. EMI: Electromagnetic Interference
  18. F/UTP: Foil over Unshielded Twisted Pair. Individual pairs are unshielded.
  19. GC: General Contractor
  20. GE: Ground Equalizer
  21. Horizontal Cabling: The cable and connecting hardware utilized to transport communications signals
  22. ICT: Infrastructure Cabling Team
  23. LAN: Local Area Network
  24. N/A: Not Applicable
  25. NIC: Not in Contract
  26. OFCI: Owner Furnished Contractor Installed
  27. OFOI: Owner Furnished Owner Installed
  28. OTDR: Optical Time Domain Reflectometer
  29. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
  30. RCDD: Registered Communications Distribution Designer
  31. RFI: Radio Frequency Interference
  32. TBA or TBD: To Be Determined
  33. TDR: Technology Distribution Room
  34. TEC: Technology Equipment Center
  35. TGB: Telecommunications Ground Bus Bar
  36. TMBC: Telecommunications Main Bonding Conductor
  37. TMGB: Telecommunications Main Grounding Bus Bar
  38. TSER: Telecommunications Service Entrance Room
  39. UTP: Unshielded Twisted Pair
  40. Work Area: approx. 100 sq. ft. equipped for workstation equipment

- 41. DCO = Data Center Operations – [Boe.Sausedo@imail.org](mailto:Boe.Sausedo@imail.org)
- 42. ICT = Information and Communications Technology – [Melissa.Lopez2@imail.org](mailto:Melissa.Lopez2@imail.org)

END OF SECTION

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SECTION 276006

APPENDIX 06 – MATERIAL SUPPLIERS

PART 1 - GENERAL

1.1 RELATED TERMS

- A. Siemon Authorized Suppliers are listed below. To help prevent counterfeiting and support warranties, known, factory authorized distributors are recommended.
1. Approved Suppliers of Siemon cable, patch panels, jacks, and parts:

**Anixter**

Randi Whittaker  
Inside Sales Main Phone: (801) 973-2121  
3775 W. California Ave. Ste 400 Fax: (801) 973-4472  
Salt Lake City, UT 84104 US Email: [randi.whittaker@anixter.com](mailto:randi.whittaker@anixter.com)

Karl Bartlam  
End User/Outside Sales Main Phone: (801) 973-2121  
3775 W. California Ave. Ste 400 Fax: (801) 973-4472  
Salt Lake City, UT 84104 US Email: [karl.bartlam@anixter.com](mailto:karl.bartlam@anixter.com)

**Graybar Electric**

Elizabeth Vaughn  
Inside Sales Main Phone: (801) 656-3016  
2841 South 900 West Fax: (801) 973-4314  
Salt Lake City, UT 84119 US Email: [Elizabeth.Vaughn@graybar.com](mailto:Elizabeth.Vaughn@graybar.com)

Erika Morrison  
Contractor Outside Sales Main Phone: (801) 656-3014  
2841 South 900 West Fax: (801) 973-4314  
Salt Lake City, UT 84119 US Email: [Erika.Morrison@graybar.com](mailto:Erika.Morrison@graybar.com)

**WESCO / CSC**

Brian Walters  
Inside Sales Main Phone: (801) 975-0600  
3210 South 900 West Fax: (801) 907-4450  
Salt Lake City, UT 84119 US Email: [Bwalters@gocsc.com](mailto:Bwalters@gocsc.com)

Adam Tueller  
Contractor Outside Sales Main Phone: (801) 975-0600  
3210 South 900 West Direct: (801) 618-6665  
Salt Lake City, UT 84119 US Email: [Atueller@wesco.com](mailto:Atueller@wesco.com)

- B. The Siemon Company is represented locally by: [Marc.Lovestrand@Siemon.com](mailto:Marc.Lovestrand@Siemon.com)

END OF SECTION



## SECTION 276007

APPENDIX 07 – SIEMON CERTIFIED  
INSTALLATION FIRMS

## PART 1 - GENERAL

## 1.1 RELATED TERMS

- A. NOTE: Cable installers have rigorous requirements to be certified for Siemon cables and products. Validation of certification is required prior to accepting a bid.
- B. The firms selected to bid must be pre-approved by the local facility IT manager. Installation firms desiring to do work for Intermountain Healthcare must be selected from the official CI list below.
- C. Current Siemon Approved/Certified Cable Installers for Siemon Network Cable. This list is up to date as of 2020-06-01.
1. **Orion Integration Group:** 8880 W. Barnes Street, Boise, ID 83709 / Phone 208 321 8000
  2. **ACS Systems:** 925 North Main St. Meridian, ID 83642 / Phone 208 331 8554
  3. **IES Commercial:** 1960 S. Milestone, Suite D, Salt Lake City, UT 84104
    - a. Jason King – Branch Manager // Phone 801 975 8182 / Fax 385 242 7366 / Mobile 801 381 1508 // [Jason.King@iescomm.com](mailto:Jason.King@iescomm.com) / [www.iescomm.com](http://www.iescomm.com)
    - b. Boyd Evans – Project Manager // Phone 801 975 8191 / Fax 385 242 7366 Mobile 801 381 1518 // [Boyd.Evans@iescomm.com](mailto:Boyd.Evans@iescomm.com) / [www.iescomm.com](http://www.iescomm.com)
  4. **Cache Valley Electric:** 1338 S. Gustin Rd., Salt Lake City, UT 84104
    - a. Travis Grant – Acct. Manager // Phone 801 908 4170 / Fax 801 908 7401 Mobile 801 870 7226 // [Travis.Grant@cve.com](mailto:Travis.Grant@cve.com) / [www.cve.com](http://www.cve.com)
    - b. Brad Readicker – Acct. Manager // Phone 801 908 2686 / Fax 801 908 7401 // [Brad.Readicker@cve.com](mailto:Brad.Readicker@cve.com) / [www.cve.com](http://www.cve.com)
  5. **Data Tech Professionals:** 1199 S 520 W, Payson, UT 84651
    - a. Jesse Pierce – President // Phone 801 960 2202 / Mobile 801 420 0463 [Jesse@datatechprofessionals.com](mailto:Jesse@datatechprofessionals.com) / [www.datatechprofessionals.com](http://www.datatechprofessionals.com)
  6. **Hunt Electric, Inc.:** 1863 W. Alexander St., Salt Lake City, UT 84119
    - a. Darrin Guevara – Division Manager // Phone 801 975 8844 [Darrin@huntelelectric.com](mailto:Darrin@huntelelectric.com) / [www.huntelelectric.com](http://www.huntelelectric.com)
  7. **NCNS Communications:** 419 West Universal Circle, Sandy, UT 84070
    - a. Jayson Nosack – Owner // Phone 801 361 4572 [Jnosack@ncns-co.com](mailto:Jnosack@ncns-co.com) / [www.ncns-co.com](http://www.ncns-co.com)
  8. **Data Plus:** 769 Middlegate Road, Henderson, NV 89118
    - a. Chris Tettamanti – Project Manager // Phone 702 795 3282 [Chris@dpcnv.com](mailto:Chris@dpcnv.com)
  9. **Bombard Electric:** 4380 West post Road, Las Vegas, NV 89118
    - a. Bob Reese – Project/Division Manager // Phone 702 263 3570 [Bob.reese@bombardelec.com](mailto:Bob.reese@bombardelec.com) / [www.bombardelectric.com](http://www.bombardelectric.com)
  10. **Rosendin Electric:** 7470 Dean Martin Dr. #112, Las Vegas, NV 89139
    - a. Cora Shadbolt – Assistant Project Mgr. // Phone 702 258 1443 [cshadbolt@rosendin.com](mailto:cshadbolt@rosendin.com)
    - b. Adrian Youngblood – Sr. Estimator // Phone 702 258 1455 [ayoungblood@rosendin.com](mailto:ayoungblood@rosendin.com)
    - c. Breck Hardesty – Sr. Project Mgr. // Phone 702 258 1428 [bhardesty@rosendin.com](mailto:bhardesty@rosendin.com) / [www.rosendin.com](http://www.rosendin.com)
  11. **Mojave Electric:** 3755 W. Hacienda Ave., Las Vegas, NV 89118 Phone 702 798 2970

12. **The Morse Group:** 3874 Silvestri Lane, Las Vegas, NV 89120  
Phone 702 257 4400

END OF SECTION

SECTION 276008

APPENDIX 08 – LEAD WALL PENETRATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Sections 13090 & 134900

1.2 RELATED TERMS

**Procedure Name:** New Port and Electrical Box Installation Lead Lined Walls

**Document Detail Information: (This section must be completed in full.)**

<b>Implements Policy:</b>	Click here to enter policy title		
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<b>Keywords (must have at least 3):</b>	Searchable Keywords (e.g., PHI, EMTALA, Coding)		

1.3 PURPOSE

- A. Maintain radiation safety controls in lead lined walls during installation of new power and data outlets in existing lead lined walls.

1.4 SCOPE

- A. Intermountain Hospitals, Intermountain Clinics Medical Group

1.5 DEFINITIONS

- A. Lead lined Walls – Structured element designed to provide a barrier to block radiation penetration beyond the designated space.
- B. Maintenance Manager – The person responsible for plant maintenance operations or his/her delegate.

- C. Radiation Safety Coordinator – The person responsible for Radiation Safety or his/her Delegate. Medical Physicist.
- D. Worker – The person responsible for completing work with the lead lined wall. This includes Intermountain Employees as well as any outside supplier or contractor.

## 1.6 PROVISIONS

- A. The Radiation Safety Program is following Utah regulation R313-15-101, R313-28 and U.S. Nuclear Regulatory Commission Regulation 1- CFR Part 20-1101.

## 1.7 PROCEDURE

- A. Prior to any work within a lead lined wall, the Worker reports to the Radiation Safety Coordinator, Maintenance Manager and completed a review of planned work “ACWP” Identification of specific description related to the lead lined wall planned work.
  - 1. Intermountain workers, outside suppliers or contractors hired to work in any Intermountain facility must contact the Maintenance Manager and Radiation Safety Coordinator prior to beginning work to discuss the project and ensure that the planned work will not interfere with facility operations, maintenance, or other projects.
  - 2. Failure to scheduled and complete the planning meeting described above may results in the delay or rescheduling of work. Outside suppliers or contractors are responsible for any costs incurred because of their failure to schedule and complete this meeting.
- B. The Radiation Safety Coordinator, Maintenance Manager and the worker conduct a pre-work inspection of the areas in which work is to be performed. This inspection identified the following:
  - 1. Areas of special concern or sensitivity, including those noted or described on the facility Life Safety records and drawings, and Radiation Safety records and drawings.
  - 2. Appropriate areas or structures to use for support of any work, as applicable.
  - 3. Existing deficiencies in Barriers.
  - 4. The as act assemblies impacted by the work.
  - 5. The type of shielding material acceptable in the area.
    - a. Lead lined boxes
    - b. Lead lined wall “inside wall” installation, and OR
    - c. Lead shielding for wall installation of “outside wall” maintaining radiation safety barriers.
  - 6. The exact condition of the areas upon completion of work.
- C. Upon completion of the work and before closing the wall, the worker, Radiation Safety Coordinator and Maintenance Manager conduct a post-work inspection of the area in which the work was performed, this inspection verifies the following:
  - 1. No Tools, Supplies or debris are left within the walls.
  - 2. Lead lining is installed to maintain radiation safety protection according to regulatory requirements.
  - 3. All work affecting Radiation Safety Lead Barriers has been properly sealed.
  - 4. The overall condition of the area meets the expectation outline in the per-work inspection.
- E. The Maintenance Manager and Radiation Safety Coordinator signs and logs the completed “ACWP”

1.8 EXCEPTIONS

- A. None.

1.9 PRIMARY SOURCES

- A. List the regulatory references upon which the procedure is based (cite the code, the title, and the statute).

1.10 SECONDARY MATERIALS

- A. Radiation Safety Policy
- B. Above Ceiling Work Permit
- C. Lead lined wall requirements as defined by Radiation Safety Building Requirements



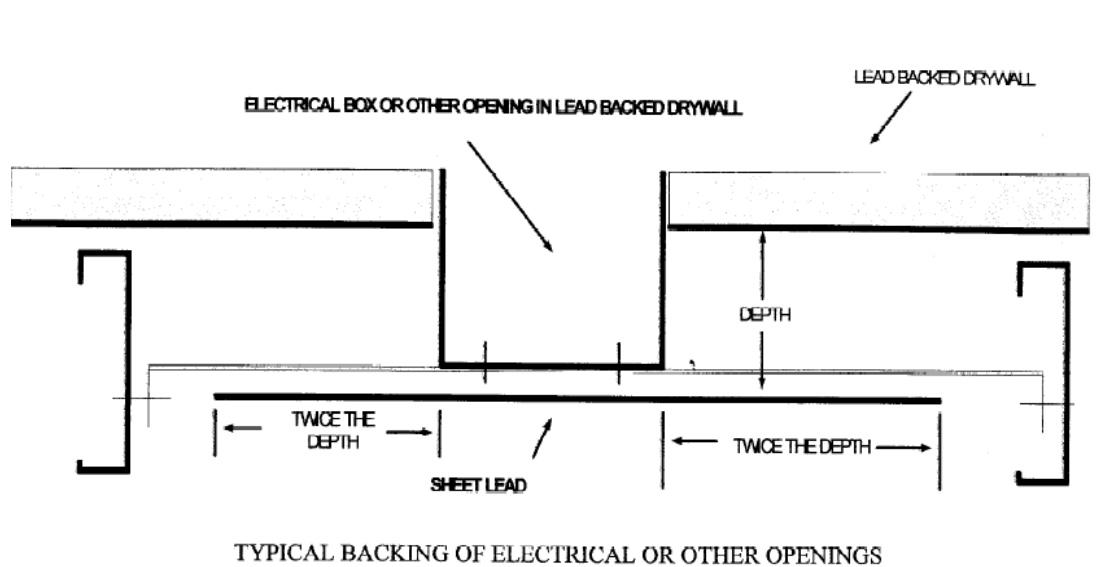
Option 1: worker to install new power utility wall box and add Lead Lining to wall behind box  
If worker can access posterior wall entry



Option 2: worker to install new power utility wall box – box is lead Lined by manufacturer



Option 3: worker to install new power utility wall box - no additional lead lining required if installation does not disrupt the existing shielding



END OF SECTION