IMC Endoscopy Room (LL-1) – Boom Addition
5121 COTTONWOOD | BUILDING 5 | MURRAY, UTAH

OWNER
Intermountain Healthcare
36 S State Street, 16th Floor | Salt Lake City, Utah

DATE
29 July 2020
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INVITATION TO BID

PROJECT: Boom addition to an Endoscopy room on Level LL-1, for Intermountain Hospital (IMED) in Murray, Utah.

LOCATION: 5121 Cottonwood Street, Building 5 Murray, Utah

OWNER: IHC Healthcare.

TIME AND PLACE: The Owner will receive bids on Thursday, August 13th, at 2:00 pm.

Intermountain Healthcare
Security Desk – 16th Floor
36 South State Street
Salt Lake City, Utah 84111-1486

Attention: AnnaLisa Silcox (AnnaLisa.Silcox@imail.org)

Bids shall be received by sealed envelope or emailed electronically to the Owner by time and at address noted above. If submitting a sealed bid, deliver to Security on the 16th floor.

TYPE OF BID: Bids shall be on a lump sum basis.

TIME OF COMPLETION Bidders shall provide a construction duration in calendar days and a Date of Substantial Completion on their bid forms. Consideration will be given to bidders offering earlier times of completion.

BIDDING DOCUMENTS: Bidding documents will be available on July 30th, 2020, thru the office of VCBO Architecture, 524 South 600 East, Salt Lake City, Utah 84102 in accordance with the Instructions to Bidders. PDF’s will be given to invited Contractors only. Bidding documents are not to be posted in the plan rooms.

BONDS: Bonds will not be required 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

PREBID CONSTRUCTION MEETING Tuesday, August 4th, at 9:30 am.

END OF SECTION
A. The Supplementary Instructions to Bidders herein describe, contain changes and additions to Section 00 0100 - AIA A701 Instructions to Bidders (included by reference - copies may be obtained from the Architect's office for the cost of reproduction). Where any part of the Instructions to Bidders is modified by these Supplementary instructions, the unaltered provisions shall remain in effect.

3.1.5 COPIES

Add the following:

The title or cover sheet to the drawings and the index to the Project Manual contains a list of all documents which comprise a full set of bid documents for this project. Any Contractor, Subcontractor, vendor or any other person participating in or bidding on this project shall be responsible for the information contained in any and all sheets of drawings and all sections of the specifications. If any person, party or entity elects to submit bids for any portion, or all, of this project, that person, party or entity shall be responsible for any and all information contained in these drawings and specifications, including, but not limited to, any subsequent addendums or clarifications that may be issued.

3.3 SUBSTITUTIONS

Amend 3.3.2 to read:

No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least 7 days prior to the date for receipt of Bids. Such requests...

3.4 ADDENDA

Amend 3.4.3 to read:

No addenda will be issued later than 24 hours prior to the date for receipt of Bids except an addendum may be issued no later than 12 hours prior to the date for receipt of bids for the purpose of cancellation or postponement of receipt of bids. It is the responsibility of the Bidder to disseminate telephone addendum information to sub-bidders.

4.2 BID SECURITY

Delete this article in its entirety. Bid bonds will not be required for this project.

4.3 SUBMISSION OF BIDS

Amend 4.3.4 to read:

Bids shall be hand delivered in sealed envelope or emailed to the Owner at the address noted in the Invitation to Bid. Bids submitted orally, or by telephone or facsimile will not be considered.
5.3 ACCEPTANCE OF BID (AWARD)

Amend 5.3.2 to read:

The Owner shall ... to determine the low bidder on the basis of the sum of the Base Bid or on the basis of the sum of the Base Bid and any combined accepted Alternates. Cost of insurance will not be used as the basis of award.

ARTICLE 7 - PERFORMANCE AND PAYMENT BOND

Delete this Article in its entirety. Bonds will not be required for this Project.

END OF SECTION
SECTION 00 4000

BID FORM

TO:  IHC Health Services, Inc. (Intermountain Healthcare)
Facility Design and Construction (FD&C)
36 South State Street, 16th Floor
Salt Lake City, Utah 84111-1486

Attention: AnnaLisa Silcox
Email: AnnaLisa.Silcox@imail.org

PROJECT: IMC Endoscopy Room (LL-1) – Boom Addition
5121 S. Cottonwood St
Murray, UT 84107

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:

Instructions to Bidders, General Conditions, Supplemental 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 IMC, Endoscopy Room (LL-1) – Boom Addition 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)

ALTERNATES:

Alternate No. 1:

ADD/DELETE ___________________________________________ Dollars ($____________________)

(In the case of discrepancy, written amount shall govern)

Required additional calendar days: __________________
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__.

ALLOWANCES:

The noted allowances are included in the returning Bid and will be tracked as individual items whereas the Owner has the discretion of use of the funds.

ADDENDA:

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

SCHEDULE OF VALUES:

I/We have attached with this Bid Form our Schedule of Values (Section 00 4373) which reflects the above Base Bid. We submit this for Owner review of subcontractors that are being proposed for this Project.

TYPE OF ORGANIZATION:

(Corporation, Partnership, Individual, etc.) ________________________________

SEAL (If a Corporation) Respectfully Submitted,

________________________________________
Name of Bidder

________________________________________
Authorized Signature
### SCHEDULE OF VALUES

**NAME OF BIDDER:**

**DATE:**

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**END OF SECTION**
PART 1 - GENERAL

1.1 SUMMARY

A. AIA Document A101 ‘Standard Form of Agreement for Construction between the Owner and General Contractor’ where the basis of payment is a STIPULATED SUM, will presumably be used on this project. A copy may be obtained from the Architect for the cost of reproduction.

B. The Owner reserves the right to use a contract form of its own creation.
SECTION 00 5433

ELECTRONIC MEDIA AGREEMENT

PART 1 - GENERAL

1.1 AGREEMENT CONCERNING DRAWING FILES ON ELECTRONIC MEDIA

A. The electronic files will be distributed from the Architect to the General Contractor only once the following form has been signed. It will be the General Contractor’s responsibility to control distribution.

B. Valentiner Crane Brunjes Onyon Architects, L.L.C. (the Architect) does not assume any responsibility for the accuracy of the information contained in these drawing files. Any and all users are aware that differences may exist between the electronic files delivered and the printed hard-copy construction documents. In the event of a conflict between the signed and sealed hard-copy construction documents prepared by the Architect and the electronic files, the signed or sealed hard-copy construction documents shall govern.

C. Any and all users who may obtain these drawings from the General Contractor under this agreement, including but not limited to; subcontractors, vendors, suppliers etc., agree to indemnify and hold harmless the Architect, its officers, directors, employees and sub-consultants against all damages, liabilities or costs, including reasonable attorneys’ fees and defense costs, arising from any changes made by anyone other than the Architect or from any transfer or reuse of the electronic files including data contained in the files without the prior written consent of the Architect.

D. Building Information Model (BIM) drawing files will be made available to the Contractor and its subcontractors for the purposes of preparing submittals for their portion of the work only after the "Agreement Concerning Drawing Files on Electronic Media" has been signed by the General Contractor.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION
AGREEMENT CONCERNING DRAWING FILES ON ELECTRONIC MEDIA

Valentiner Crane Brunjes Onyon Architects, L.L.C. (the Architect) does not assume any responsibility for the accuracy of the information contained in these digital models. Any and all users are aware that differences may exist between the electronic files delivered and the printed hard-copy construction documents. In the event of a conflict between the signed and sealed hard-copy construction documents prepared by the Architect and the electronic files, the signed or sealed hard-copy construction documents shall govern.

Any and all users who may obtain these digital models from the General Contractor under this agreement, including but not limited to; subcontractors, vendors, suppliers etc., agree to indemnify and hold harmless the Architect, its officers, directors, employees and sub-consultants against all damages, liabilities or costs, including reasonable attorneys’ fees and defense costs, arising from any changes made by anyone other than the Architect or from any transfer or reuse of the electronic files without the prior written consent of the Architect.

Under no circumstances shall delivery of the electronic digital models be deemed a sale by the Architect, and the Architect makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall the Architect be liable for any loss of profit or any consequential damages as a result of the use or reuse of the electronic files.

The digital Building Information Models provided will contain information as provided on construction documents. The user shall remove all notes, text, detail cuts and member designations from the electronic file prior to use. If used as submittal documents, submittals will be rejected if non-compliant. The drawing files provided by VCBO may not be reproduced or distributed to individuals outside the company or collective organization signing this agreement.

LIST OF DRAWINGS:

Project Name: IMC ENDOSCOPY ROOM (LL-1) – BOOM ADDITION
VCBO Project # 20430

List of Revit Models: Architectural, Structural, and Electrical.

_______________________________________
Name of Company/Contractor

_______________________________________
Signature of Company/Contractor
Representative

_______________________________________
Printed Name of Individual Signing

_______________________________________
Position/Title

_______________________________________
Date

This agreement must be signed and returned to VCBO prior to release of any electronic document.
PART 1 - GENERAL

1.1 SUMMARY

A. The following AIA documents are incorporated by reference; copies may be obtained from the Architect for the cost of reproduction.
   1. AIA Document G702 – ‘Application and Certificate for Payment’
   2. AIA Document G703 – ‘Application and Certificate for Payment - Continuation’
   3. AIA Document G701 – ‘Change Order’
   4. AIA Document G704 – ‘Certificate of Substantial Completion’
   5. AIA Document G707 – ‘Consent of Surety to Final Payment’
   6. AIA Document G707A – ‘Consent of Surety to Reduction in or Partial Release of Retainage’
SECTION 00 6276.13

EXEMPTION CERTIFICATE

PART 1 - GENERAL

1.1 SUMMARY

A. Construction materials purchased by or on behalf of Intermountain Healthcare may be exempt from Utah sales and use taxes. Tax Exempt Form TC-721 must be used by vendors when purchasing construction materials for Intermountain Healthcare projects. A copy of Form TC-721, with the Owner’s pertinent tax information, follows this cover page.
**Resale or Re-lease**
I certify I am a dealer in tangible personal property or services that are for resale or re-lease. If I use or consume any tangible personal property or services I purchase tax free for resale, or if my sales are of food, beverages, dairy products and similar confections dispensed from vending machines (see Rule R865-19S-74), I will report and pay sales tax directly to the Tax Commission on my next sales and use tax return.

**Religious or Charitable Institution**
I certify the tangible personal property or services purchased will be used or consumed for essential religious or charitable purposes. This exemption can only be used on purchases totaling $1,000 or more, unless the sale is pursuant to a contract between the seller and purchaser.

**Construction Materials Purchased for Religious and Charitable Organizations**
I certify the construction materials are purchased on behalf of a religious or charitable organization and that they will be installed or converted into real property owned by the religious or charitable organization.
Name of religious or charitable organization: Intermountain Healthcare
Name of project: IMC Imaging - X-Ray Upgrade

**Fuels, Gas, Electricity**
I certify all natural gas, electricity, coal, coke, and other fuel purchased will be used for industrial use only and not for residential or commercial purposes.

**Machinery and Equipment and Normal Operating Repair or Replacement Parts Used in a Manufacturing Facility, Mining Activity, Web Search Portal or Medical Laboratory**
I certify the machinery and equipment, normal operating repair or replacement parts, or materials (except office equipment or office supplies) are for use in a Utah manufacturing facility described in SIC Codes 2000-3999 or a NAICS code within NAICS Sector 31-33; in a qualifying scrap recycling operation; in a co-generation facility placed in service on or after May 1, 2006; in the operation of a Web search portal by a new or expanding business described in NAICS Code 518112; in a medical laboratory described in NAICS Code 621511; or in a business described in NAICS 212, Mining (except Oil and Gas), or NAICS 213113, Support Activities for Coal Mining, NAICS 213114, Support Activities for Metal Mining, or NAICS 213115, Support Activities for Nonmetallic Minerals (except Fuels) Mining. For a definition of exempt mining equipment, see Utah Code §59-12-104(14).

**Machinery and Equipment and Normal Operating Repair or Replacement Parts Used in an Electronic Payment Service**
I certify the machinery and equipment and normal operating repair or replacement parts have an economic life of three years or more and are for use in the operation of an electronic payment service described in NAICS Code 522320.

**Machinery or Equipment Used by Payers of Admissions or User Fees**
I certify that: (1) the machinery or equipment has an economic life of three or more years and will be used by payers of admissions or user fees (Utah Code §59-12-103(1)(f)); (2) the buyer is in the amusement, gambling, or recreation industry (NAICS Subsector 713); and (3) at least 51 percent of the buyer's sales revenue for the previous calendar quarter came from admissions or user fees.

**Refinery Machinery, Equipment and Normal Repair or Replacement Parts**
I certify the machinery, equipment, normal operating repair parts, catalysts, chemicals, reagents, solutions or supplies are for the use of a refiner who owns, leases, controls, or supervises a refinery (see Utah Code §63M-4-701) located in Utah.

**Pollution Control Facility**
I certify our company has been granted a "Certification of Pollution Control Facilities" as provided for by Utah Code §§19-12-101 - 19-12-305 by either the Air Quality Board or the Water Quality Board. I further certify each item of tangible personal property purchased under this exemption is qualifying.

**Municipal Energy**
I certify the natural gas or electricity purchased is for resale; is prohibited from taxation by federal law, the U.S. Constitution, or the Utah Constitution; is for use in compounding or producing taxable energy; is subject to tax under the Motor and Special Fuel Tax Act; is used for a purpose other than as a fuel; is used by an entity exempted by municipal ordinance; or is for use outside a municipality imposing a municipal energy sales and use tax. The normal sales tax exemptions under Utah Code §59-12-104 do not apply to the Municipal Energy Sales and Use Tax.

**Short-term Lodging Consumables**
I certify the tangible personal property is consumable items purchased by a lodging provider as described in Utah Code §59-12-103(1)(i).
☐ Direct Mail
I certify I will report and pay the sales tax for direct mail purchases on my next Utah Sales and Use Tax Return.

☐ Commercial Airlines
I certify the food and beverages purchased are by a commercial airline for in-flight consumption; or, any parts or equipment purchased are for use in aircraft operated by common carriers in interstate or foreign commerce.

☐ Commercials, Films, Audio and Video Tapes
I certify that purchases of commercials, films, prerecorded video tapes, prerecorded audio program tapes or records are for sale or distribution to motion picture exhibitors, or commercial television or radio broadcasters. If I subsequently resell items to any other customer, or use or consume any of these items, I will report any tax liability directly to the Tax Commission.

☐ Alternative Energy
I certify the tangible personal property meets the requirements of Utah Code §§9-12-104 and is leased or purchased by or for an alternative energy electricity production facility, a waste energy production facility, or a facility that produces fuel from alternative energy.

☐ Locomotive Fuel
I certify this fuel will be used by a railroad in a locomotive engine.

☐ Research and Development of Alternative Energy Technology
I certify the tangible personal property purchased will be used in research and development of alternative energy technology.

☐ Life Science Research and Development Facility
I certify that: (1) the machinery, equipment and normal operating repair or replacement parts purchased have an economic life of three or more years for use in performing qualified research in Utah; or (2) construction materials purchased are for use in the construction of a new or expanding life science research and development facility in Utah.

☐ Mailing Lists
I certify the printed mailing lists or electronic databases are used to send printed material that is delivered by U.S. mail or other delivery service to a mass audience where the cost of the printed material is not billed directly to the recipients.

☐ Semiconductor Fabricating, Processing or Research and Development Material
I certify the fabricating, processing, or research and development materials purchased are for use in research or development, manufacturing, or fabricating of semiconductors.

☐ Telecommunications Equipment, Machinery or Software
I certify these purchases or leases of equipment, machinery, or software, by or on behalf of a telephone service provider, have a useful economic life of one or more years and will be used to enable or facilitate telecommunications; to provide 911 service; to maintain or repair telecommunications equipment; to switch or route telecommunications service; or for sending, receiving, or transporting telecommunications service.

☐ Ski Resort
I certify the snow-making equipment, ski slope grooming equipment or passenger rope-ways purchased are to be paid directly with funds from the ski resort noted on the front of this form.

☐ Aircraft Maintenance, Repair and Overhaul Provider
I certify these sales are to or by an aircraft maintenance, repair and overhaul provider for the use in the maintenance, repair, overhaul or refurbishment in Utah of a fixed-wing, turbine-powered aircraft that is registered or licensed in a state or country outside Utah.

☐ Leasebacks
I certify the tangible personal property leased satisfies the following conditions: (1) the property is part of a sale-leaseback transaction; (2) sales or use tax was paid on the initial purchase of the property; and, (3) the leased property will be capitalized and the lease payments will be accounted for as payments made under a financing arrangement.

☐ Film, Television, Radio
I certify that purchases, leases or rentals of machinery or equipment will be used by a motion picture or video production company for the production of media for commercial distribution.

☐ Prosthetic Devices
I certify the prosthetic device(s) is prescribed by a licensed physician for human use to replace a missing body part, to prevent or correct a physical deformity, or support a weak body part. This is also exempt if purchased by a hospital or medical facility. (Sales of corrective eyeglasses and contact lenses are taxable.)

☐ Out-of-State Construction Materials
I certify this tangible personal property, of which I am taking possession in Utah, will be taken out-of-state and will become part of real property located in a state that does not have sales tax, is taxed at a lower rate, or does not allow credit for tax paid to Utah. I will report the tax on my next Utah return at the lower of the Utah rate where the tangible personal property was purchased or the rate of the location where the tangible personal property is converted to real property in the other state if the other state allows a credit for tax paid to Utah.

☐ Agricultural Producer
I certify the items purchased will be used primarily and directly in a commercial farming operation and qualify for the Utah sales and use tax exemption. This exemption does not apply to vehicles required to be registered.

☐ Tourism/Motor Vehicle Rental
I certify the motor vehicle being leased or rented will be temporarily used to replace a motor vehicle that is being repaired pursuant to a repair or an insurance agreement; the lease will exceed 30 days; the motor vehicle being leased or rented is registered for a gross laden weight of 12,001 pounds or more; or, the motor vehicle is being rented or leased as a personal household goods moving van. This exemption applies only to the tourism tax (up to 7 percent) and the short-term motor vehicle rental tax (Transportation Corridor Funding - 2.5 percent) – not to the state, local, transit, zoo, hospital, highways, county option or resort sales tax.

☐ Textbooks for Higher Education
I certify that textbooks purchased are required for a higher education course, for which I am enrolled at an institution of higher education, and qualify for this exemption. An institution of higher education means: the University of Utah, Utah State University, Utah State University Eastern, Weber State University, Southern Utah University, Snow College, Dixie State University, Utah Valley University, Salt Lake Community College, or the Utah System of Technical Colleges.

* Purchaser must provide sales tax license number in the header on page 1.

NOTE TO PURCHASER: You must notify the seller of cancellation, modification, or limitation of the exemption you have claimed.

Questions? Email taxmaster@utah.gov, or call 801-297-2200 or 1-800-662-4335.
PART 1 - GENERAL

1.1 SUMMARY

A. **Owner’s General Conditions of the Contract for Construction**, dated 01/2016, follow this cover page.

B. **In addition to markup rates noted in Article 7** of the “Owner’s General Conditions of the Contract for Construction”, the Owner shall impose the following limits:

1. **Markup Limits for Additional Services or other Modifications.** Markups for additional work, changes, or other Modifications will in no event exceed the following limits:
   a. 10% for the Subcontractor or Sub-subcontractor on additional Modification work performed by such Subcontractor or Sub-subcontractor;
   b. 5% for Subcontractors (of any tier) on the additional Modification work they managed of other Subcontractors;
   c. 5% for Contractor on all Modification work Contractor managed of Subcontractors (but not chargeable on self-performed work by Contractor).
   d. 7% for Contractor on additional Modification work self-performed by Contractor.
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ARTICLE 1
GENERAL PROVISIONS

1.1 BASIC DEFINITIONS
A/E. “A/E” means the person lawfully licensed to practice architecture or engineering or an entity lawfully practicing architecture or engineering identified as such in the A/E’s Agreement and is referred to throughout the Contract Documents as if singular in number. The term “A/E” also means the A/E’s representative and its subconsultants. When these General Conditions are part of a Contract in which the design professional is an interior designer, landscape subconsultant or other design professional, the term “A/E” as used in these General Conditions shall be deemed to refer to such design professional. A license is not required when the type of design professional is one which is not subject to a professional license, but such professional must meet the prevailing standards in the State of Utah for such practice. For projects where there is no A/E hired by Intermountain, the references in the General Conditions to A/E shall be deemed to refer to Intermountain as may be practicably applied.

A/E’s AGREEMENT. “A/E’s Agreement” means, unless the context requires otherwise, the agreement executed by the A/E and Intermountain for the Project.

ADDENDA. “Addenda” means the written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding documents or the Contract Documents.

ASI. “ASI” shall mean a Supplemental Instruction issued by the A/E to the Contractor which may result in clarifications or minor changes in the Work and does not affect the contract time or the contract amount.

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

BONDS. “Bonds” mean the bid bond, performance and payment bonds and other instruments of security

CHANGE ORDER. “Change Order” means a written instrument signed by Intermountain and Contractor, stating their agreement for changes of the Contract as specified on the required Intermountain change order form.

CLAIM. “Claim” means a dispute, demand, assertion or other matter arising in connection with the Contract or the Project, whether submitted by Intermountain or the Contractor, including a Subcontractor at any tier subject to the provisions of these General Conditions. A requested amendment, requested change order, or a Construction Change Directive (CCD) is not Claim unless agreement cannot be reached and the procedures of these General Conditions are followed.

CM/GC. “CM/GC” means the Construction Manager/General Contractor, whether a person or entity, identified in the CM/GC Agreement, and is referred to throughout the Contract
Documents as if singular in number. The term “CM/GC” means the CM/GC or its authorized representative.

**CM/GC AGREEMENT.** “CM/GC Agreement” means, if applicable, the agreement executed by the CM/GC and Intermountain for the Project.

**CONSTRUCTION CHANGE DIRECTIVE.** A “Construction Change Directive” or “CCD” means 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. The term “Contract” represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the A/E and Contractor, (2) between Intermountain and a Subcontractor or (3) between any persons or entities other than Intermountain and Contractor. The Contract may be amended or modified only by (1) a written amendment executed by both Intermountain and Contractor, or (2) by a Modification.

**CONTRACT DOCUMENTS.** The term “Contract Documents” means the Contractor’s Agreement between Intermountain and Contractor (hereinafter referred to as “Contractor’s Agreement”), the Conditions of the Contract (General, Supplementary and other Conditions), the Drawings, Specifications, Addenda, other documents listed in the Contractor’s Agreement and Modifications issued after execution of the Contractor’s Agreement. The Contract Documents shall also include the bidding/proposal documents, including the Instructions to Bidders/Proposers, Notice to Contractors, the Bid/Proposal Form, and/or the response to the request for proposal, to the extent not in conflict with the other above-stated Contract Documents and other documents and oral presentations as part of the Selection which are documented as an attachment to the Contract.

**CONTRACT SUM.** The term “Contract Sum” means the Contract Sum as stated in the Contractor’s Agreement and, including authorized and signed adjustments to this agreement (modifications), is the total amount payable by Intermountain to the Contractor for performance of the Work under the Contract Documents.

**CONTRACT TIME.** “Contract Time,” unless otherwise provided in the Contract Documents, means the period of time, including authorized and signed adjustments (modifications), stated in the Contract Documents for Substantial Completion of the Work.

**CONTRACTOR.** The Contractor is the person or entity identified as such in the Contractor’s Agreement or the CM/GC Agreement, as applicable, and is referred to throughout the Contract Documents as if singular in number. The term “Contractor” means the Contractor or the Contractor’s authorized representative. When separate contracts are awarded for different
portions of the Project or other construction or operations on the site, the term “Contractor” in the Contract Documents in each case, shall mean the Contractor who executes each separate Contractor’s or CM/GC Agreement, as applicable.

**CONTRACTOR’S AGREEMENT.** “Contractor’s Agreement” means, unless the context requires otherwise, the stipulated sum agreement executed by the Contractor and Intermountain for the Project.

**DAY.** The term “day” or “days” as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

**DEFECTIVE.** “Defective” is an adjective which when modifying the word “Work” refers to 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 has been damaged.

**DIRECTOR.** “Director” means Intermountain’s Director of Facility Planning and Development unless the context requires otherwise. Director may include a designee selected by the Director for the particular function referred to in the General Conditions.

**DRAWINGS.** The “Drawings” are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, and generally include the drawings, elevations, sections, details, schedules and diagrams.

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

**INTERMOUNTAIN/OWNER’S REPRESENTATIVE.** The “Intermountain Representative” or “Owner’s Representative” is the person (also referred to as the “Project Manager”) assigned by the Director to manage the Project and is the sole person authorized to act on behalf of Intermountain under this Agreement.

**INSPECTION.** The word “inspection” or its derivatives shall mean a review of the Project, including but not limited to a visual review of the Work completed to date to ascertain if the Work is in accordance with the Contract Documents, including all applicable building codes and construction standards.

**INVITATION TO BID.** “Invitation to Bid” means Intermountain’s solicitation or request to a contractor to provide a Bid.

**MODIFICATION.** A “Modification” is (1) a Change Order (2) Construction Change Directive or (3) ASI.

**NOTICE TO PROCEED.** A “Notice to Proceed” is a document prepared by Intermountain and by its terms authorizes the Contractor to commence Work on the Project. It is deemed issued
upon being sent by Intermountain to the Contractor’s specified address within the Bid or Proposal.

**PARTIAL USE.** “Partial Use” means 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. This partial use does not constitute “substantial completion.”

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

**PROJECT.** The “Project” means the total construction of the Work performed under the Contract Documents.

**PROJECT MANUAL (FOR CONSTRUCTION).** The “Project Manual” is the volume of assembled Specifications for the Work and may include the bidding/proposal requirements, sample forms, General or Supplementary Conditions of the Contract.

**PROPOSAL.** “Proposal” means the A/E’s or CM/GC’s response to Intermountain’s Request for Proposal.

**PROPOSAL REQUEST OR “PR.”** A “Proposal Request” or “PR” is a proposal request filed with the Contractor for the purposes of seeking a proposal in order to resolve an issue as part of the Change Order or Contract Modification process.

**PROPOSED CHANGE ORDER.** A “Proposed Change Order” (“PCO”), is an informal request by the Contractor filed with Intermountain Representative, in an effort to commence the Contract Modification Process. It shall 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 in which the Contractor intends to seek additional monies or time.

**REQUEST FOR INFORMATION or RFI.** A “Request for Information” or “RFI” is a request filed by the Contractor with the A/E regarding any request for information, direction or clarification related to the Contract Documents, plans or specifications.

**REQUEST FOR PROPOSAL or RFP.** “Request for Proposal” or “RFP” means Intermountain’s solicitation for A/E or CM/GC Proposals.

**SALES TAX and/or USE TAX.** Sales Tax and/or Use Tax, unless the context requires otherwise, shall mean the sales tax and/or use tax collected or to be collected by the Utah State Tax Commission and shall include any sales and/or use tax that the Utah State Tax Commission collects on behalf of any special district, local government or political subdivision. Intermountain is a sales-tax exempt entity for materials supplied to the Project and will provide a Utah State Tax Commission Exemption Certificate to the Contractor.

**SAMPLES.** “Samples” mean physical examples, which illustrate materials, equipment or workmanship and establishes standards by which the Work will be judged.
SHOP DRAWINGS. “Shop Drawings” means drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

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

SUBCONTRACTOR. “Subcontractor” means the person or entity that has a direct contract with the Contractor, including any trade contractor or specialty contractor, or with another Subcontractor at any tier to provide labor or materials for the work but does not include suppliers who provide only materials, equipment or supplies to a contractor or subcontractor. Notwithstanding the foregoing, the text in which the term is used may provide for the exclusion of Subcontractors of other Subcontractors or the exclusion of suppliers. The term “Subcontractor” is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or authorized representative of the Subcontractor. The Term “Subcontractor” does not include a separate contractor or subcontractors of a separate contractor.

SUBSTANTIAL COMPLETION. Substantial Completion” is the date certified in accordance with Article 9.2 and means the date the Work or designated portion thereof is sufficiently complete, and any lack of completion or performance does not reasonably interfere with Intermountain’s intended use of the Project, in accordance with the Contract Documents so that Intermountain can occupy and use the Work for its intended use.

WORK. The term “Work” means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, materials, equipment and services provided, or to be provided, by the Contractor to fulfill the Contractor’s obligations.

ARTICLE 2
INTERMOUNTAIN

2.1 INFORMATION AND SERVICES REQUIRED OF INTERMOUNTAIN

2.1.1 INTERMOUNTAIN’S REPRESENTATIVE. Intermountain shall designate an Intermountain Representative authorized to act in Intermountain’s behalf with respect to the Project. Intermountain or such authorized representative shall render decisions within a reasonable time pertaining to documents submitted by the A/E and/or Contractor in order to avoid a compensable delay in the orderly and sequential progress of the Project.

2.1.2 SPECIALISTS AND INSPECTORS. Intermountain will provide certified building inspection services in accordance with the adopted Building Codes. This includes ‘routine’ and ‘special’ inspections unless otherwise noted in the A/E Agreement. 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 the Contractor of the responsibilities set forth in the Contract Documents.
2.1.3 SURVEYS AND LEGAL DESCRIPTION. Intermountain shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall review this information, including the surveys and any provided geotechnical studies, and compare such information with observable physical conditions and the Contract Documents.

2.1.4 PROMPT INFORMATION AND SERVICES. Upon receipt of a written request from the Contractor, Intermountain shall furnish information or services under Intermountain’s control with reasonable promptness to avoid delay in the orderly progress of the Work.

2.1.5 COPIES OF DRAWINGS AND PROJECT MANUALS (FOR CONSTRUCTION). Unless otherwise provided in the Contract Documents, the 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.

2.1.6 OTHER DUTIES. The foregoing is in addition to other duties and responsibilities of Intermountain enumerated herein and especially those in respect to Article 2.2 (Construction by Intermountain or by Separate Contractors), Article 8 (Payments and Completion) and Article 10 (Insurance and Bonds).

2.2 CONSTRUCTION BY INTERMOUNTAIN OR BY SEPARATE CONTRACTORS

2.2.1 INTERMOUNTAIN’S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS.

(1) 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 in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver or subrogation.

(2) COORDINATION AND REVISIONS. Intermountain shall provide for coordination of the activities of Intermountain’s own forces and of each separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and Intermountain in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule and Contract Sum deemed necessary after a joint review and agreement by Intermountain. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and Intermountain until subsequently revised.

2.2.2 MUTUAL RESPONSIBILITY

(1) CONTRACTOR COORDINATION. The Contractor shall afford Intermountain and separate contractor(s) a reasonable opportunity for delivery and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor’s construction and operations with theirs as required by the Contract Documents.

(2) REPORTING PROBLEMS TO INTERMOUNTAIN. If part of the Contractor’s Work depends on work by Intermountain or a separate contractor, the Contractor
shall, prior to proceeding with that portion of the Work, promptly report in writing to Intermountain apparent defects in workmanship that would render it unsuitable for proper execution. Failure of the Contractor to make said report shall constitute an acknowledgment that Intermountain’s or separate contractors completed or partially completed construction is fit and proper to receive the Contractor’s Work, except as to defects in workmanship not then reasonably discoverable.

(3) **COSTS.** Costs caused by delays or by improperly timed activities or defective construction shall be borne by the responsible party in accordance with the procedures and provisions of the Contract Documents.

(4) **CONTRACTOR REMEDIAL WORK.** The Contractor shall promptly remedy damage caused by the Contractor to completed or partially completed Work or to property of Intermountain or separate contractors and subcontractors as provided in Article 6.

**ARTICLE 3**

A/E

3.1 **A/E’S ADMINISTRATION OF THE CONTRACT**

3.1.1 **IN GENERAL.** The A/E assists Intermountain with the administration of the Contract as described in the Contract Documents. The A/E shall have the authority to act on behalf of Intermountain only to the extent provided in the Contract Documents or A/E’s Agreement.

3.1.2 **SITE VISITS**

(1) Site visits or inspections by the A/E, Intermountain or any Intermountain representative shall in no way limit or affect the 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.

(2) **WRITTEN REPORT.** The A/E shall promptly submit to Intermountain a written report subsequent to each site visit.

3.1.3 **COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION.** Except as authorized by the Intermountain Representative or as otherwise provided in the Contract Documents, including these General Conditions, the A/E and Contractor shall communicate through the Intermountain Representative on issues regarding the timing of the Work, cost of the Work or scope of the Work. Contractor shall comply with communication policies agreed upon at any pre-construction meeting with Intermountain. Communications by and with the A/E sub-consultants shall be through the A/E. Communications by and with Subcontractors shall be through the Contractor. Communications by and with separate contractors shall be through Intermountain.

3.1.4 **A/E MAY REJECT WORK, ORDER INSPECTION, TESTS.** The A/E shall have the responsibility and authority to reject Work which, based upon the A/E’s knowledge or what may be reasonably inferred from the A/E’s site observations and review of data, does not conform to the Contract Documents. Whenever the A/E considers it necessary or advisable for implementation of the intent of the Contract Documents, the A/E shall have the responsibility and 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, provided, however, the A/E must obtain Intermountain’s prior written approval of any such additional inspections or testing. However, neither this authority of the A/E nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the A/E to the Contractor, Subcontractors, their agents or employees or other persons performing portions of the Work, including separate contractors. If the Contractor disputes the rejection of any Work and the correction thereof shall involve additional cost or time, it shall be Intermountain’s option to accept such Work whether it be conforming or nonconforming.

3.1.5 A/E REVIEW CONTRACTOR’S SUBMITTALS

(1) Contractor shall submit shop drawings, product data, and samples and other submittals required by the Contract Documents to the A/E as required by the approved submittal schedule.

(2) The A/E shall 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 shall not constitute a Modification of this Agreement.

(3) The A/E’s action shall be taken no later than 15 days following A/E’s receipt of the submittal, unless agreed to otherwise by Contractor and Intermountain, in order to avoid a delay in the Work of the Contractor or of separate contractors while allowing sufficient time in the A/E’s professional judgment to permit adequate review.

(4) 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 the Contractor as required by the Contract Documents.

(5) The A/E’s review of the Contractor’s submittals shall not relieve the Contractor of the obligations under the Contract Documents.

(6) The A/E’s review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the A/E, of any construction means, methods, techniques, sequences or procedures.

(7) The A/E’s approval of a specific item shall not indicate approval of an assembly of which the item is a component.

(8) When professional certification of performance characteristics of materials, systems or equipment is required by the Contract Documents, the A/E shall 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 the A/E are and shall remain the property of Intermountain, and Intermountain shall retain all common law, statutory and other reserved rights with respect thereto. Said documents were
prepared and are intended for use as an integrated set for the Project which is the subject of this Contractor’s Agreement. The Contractor shall not modify or use Contract Documents on any other project without the prior written consent of Intermountain and A/E. Any such non-permissive use or modification, by Contractor, the Contractor’s Subcontractors at any tier or anyone for whose acts the Contractor is liable, shall be at Contractor’s sole risk. Contractor shall 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 the Contractor. The Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the A/E appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the A/E. 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.

ARTICLE 4
CONTRACTOR

4.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

4.1.1 REVIEWING CONTRACT DOCUMENTS, INFORMATION, REPORTING ERRORS, INCONSISTENCIES OR OMISSIONS. The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by Intermountain pursuant to Article 2.1 hereinabove and shall at once report to Intermountain and A/E errors, inconsistencies or omissions discovered. The Contractor shall not be liable to Intermountain or A/E for damage resulting from errors, inconsistencies or omission in the Contract Documents, unless the Contractor recognized such error, inconsistency or omission or a Contractor of ordinary skill and expertise for the type of Work involved would have readily so recognized such error, inconsistency or omission, and the Contractor failed to report such to Intermountain and A/E. If the Contractor performs any construction activity without such notice to Intermountain and A/E and prior to the resolution of the error, inconsistency or omission, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

4.1.2 FIELD CONDITIONS. The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the 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 shall be reported to Intermountain and A/E at once. If the Contractor performs any construction activity without such notice to Intermountain and A/E and prior to the resolution of the error, inconsistency or omission, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.
4.1.3 PERFORM IN ACCORDANCE WITH CONTRACT DOCUMENTS AND SUBMITTALS. The Contractor shall perform the Work in accordance with the Contract Documents and submittals approved in accordance with the Contract Documents.

4.1.4 PERFORMANCE TO PRODUCE THE COMPLETE SYSTEM AND INTENDED RESULTS. Performance by the Contractor shall 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 the Contractor. The Contract Documents are complimentary, and what is required by one Document or provisions thereof shall 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 shall govern as listed below:

1. A particular Modification shall govern over all Contract Document provisions or Modifications issued prior to said particular Modification.

2. Attachments to the Contractor’s Agreement resulting from the Selection process including any management plan or documented interview information shall govern over addenda, the General Conditions, plans and specifications.

3. A particular Addendum shall govern over all other Contract Document provisions issued prior to said particular Addendum. Subsequent Addenda shall govern over all prior Addenda.

4. The Supplementary General Conditions shall govern over the General Conditions.

5. These General Conditions shall govern over all other Contract Documents except for the Supplementary General Conditions, Addenda, Modifications and Attachments resulting from the selection process.

6. The drawings and specifications shall not govern over any of the documents listed above.

7. 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, shall not control the 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.
4.1.7 PLANNING AND PRIORITY. The Contractor shall plan and schedule its work to facilitate the Project and shall maintain a work schedule to place proper priority to sequence work to complete the project timely.

4.2 SUPERVISION AND CONSTRUCTION PROCEDURES

4.2.1 SUPERVISION AND CONTROL. The Contractor shall supervise and direct the Work, using the Contractor’s best skill and attention. The Contractor shall be solely responsible for and have control over the construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, except to the extent that the Contract Documents expressly and specifically state otherwise.

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

4.2.3 NOT RELIEVED OF OBLIGATIONS. The Contractor shall 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 required or performed by persons other than the Contractor or for those that the Contractor is liable.

4.2.4 INSPECTIONS AND APPROVALS

(1) The Contractor is responsible for requesting inspections for various stages and portions of the Work required under the Contract Documents in a timely manner.

(2) If any of the Work is required to be inspected or approved by the terms of the Contract Documents by any public authority, the Contractor shall timely request such inspection or approval to be performed in accordance with Article 9. Except as provided in Article 9, work shall not proceed without any required inspection and the associated authorization to proceed. Contractor shall 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, the Contractor shall 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. The Contractor shall enforce strict discipline and good order among the Contractor’s employees, its Subcontractors, agents, representatives and other persons performing under the Contract Documents. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

4.4 TAXES AND OTHER PAYMENTS TO GOVERNMENT. The Contractor shall pay sales, consumer, use, employment-related and similar taxes related to the Work or portions
whereof provided by the 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 shall comply with the laws and regulations regarding the payment of Sales and/or Use Tax and any exemptions; provided that, Intermountain is a sales-tax exempt entity for materials supplied to the Project and will provide a Utah State Tax Commission Exemption Certificate to the Contractor.

4.5 PERMITS, FEES, NOTICES, LABOR AND MATERIALS

4.5.1 PERMITS AND FEES. Unless required in the Supplementary General Conditions or an Addendum, it will not be necessary for the Contractor to obtain or pay for local building permits, plan check fees, electrical permits, plumbing permits, connection fees, or impact fees, nor will it be necessary to pay fees for inspections pertaining thereto.

4.5.2 COMPLIANCE WITH PUBLIC AUTHORITIES, NOTICES. The Contractor shall comply with and give notices required by laws, ordinances, resolutions, rules, regulations and lawful orders of public authorities bearing on the performance of the Work.

4.5.3 CORRELATION OF CONTRACT DOCUMENTS AND ENACTMENTS. It is not the 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 the 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, the Contractor shall promptly notify the A/E and Intermountain in writing, and necessary changes shall be accomplished by appropriate Modification.

4.5.4 FAILURE TO GIVE NOTICE. If the Contractor, or any Subcontractor thereof performs Work without complying with the requirements of this Article 4.5 hereinabove, the Contractor shall assume appropriate responsibility for such Work and shall bear the appropriate amount of the attributable costs.

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

4.7 TIME AND CONTRACTOR’S CONSTRUCTION SCHEDULES

4.7.1 PROGRESS AND COMPLETION

(1) TIME IS OF THE ESSENCE; COMPLETE WITHIN CONTRACT TIME. Time is of the essence. By executing the Contractor’s Agreement, the Contractor confirms that the Contract Time is adequate to perform the Work. The Contractor shall proceed expeditiously with adequate forces to achieve Substantial Completion within the Contract Time.

(2) NOTICE TO PROCEED AND INSURANCE. The Contractor shall not prematurely commence operations on the site or elsewhere prior to the issuance of a Notice to
Proceed by Intermountain or prior to the effective date of insurance required by Article 10 to be furnished by the Contractor, whichever is the latter.

4.7.2 SCHEDULE PREPARATION. The Contractor, promptly after being awarded the Contract, shall prepare and submit for Intermountain’s and A/E’s review, a reasonably detailed CPM schedule for the Work. The schedule shall 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 the Contractor shall 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 the Contractor, Contractor shall 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 shall be developed using Primavera, MS Project, or Suretrack unless otherwise authorized by Intermountain Representative. The Contractor’s schedule shall be updated at least once per month and submitted with each pay request. The Contractor shall maintain an original baseline schedule and shall 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 shall 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 shall be given in calendar days. The Schedule shall also indicate all of the following:

1. Interfaces with the work of outside contractors (e.g., utilities, power and with any separate Contractor);
2. Description of activity including activity number/numbers;
3. Estimated duration time for each activity;
4. Early start, late start, early finish, late finish date, and predecessor-successors including stop-start relationships with lead and lag time for each activity;
5. Float available to each path of activities;
6. Actual start date for each activity begun;
7. Actual finish date for each activity completed;
(8) The percentage complete of each activity in progress or completed;

(9) Identification of all critical path activities;

(10) The critical path for the Project, with said path of activities being clearly and easily recognizable on the time-scaled network diagram. The path(s) with the least amount of float 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 shall be clearly shown on the network diagram;

(11) Unless otherwise authorized by Intermountain Representative, all activities on the schedule representing construction on the site may not have duration longer than 14 days. Construction items that require more than 14 days to complete must be broken into identifiable activities on the schedule with durations less than 14 days. The sum of these activities represents the total length required to complete that construction item; and

(12) 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 or slack 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 the Contractor, Intermountain has the right to use the float time for non-critical path activities until the Contractor has reallocated such time on a newly submitted schedule.

4.7.8 INITIAL SCHEDULE SUBMISSION. No progress payments will be approved until the Contractor has submitted a Project detailed CPM schedule for the entire project.

4.7.9 UPDATES. Prior to any approval of a pay request, Intermountain, A/E and Contractor shall review the 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, the Contractor shall then update and submit to Intermountain the schedule with the pay request; all of which in accordance with Intermountain’s approval. All updates shall be provided in electronic and hard copy formats. At each scheduled meeting with Intermountain Representative, the Contractor shall provide a “three week look ahead” with long lead items identified.

4.7.10 SCHEDULE OF SUBMITTALS. The Contractor shall prepare and keep current, for the A/E’s and Intermountain’s review, a schedule of submittals required under the Contract Documents which is coordinated with the Contractor’s construction schedule and allows the 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 7 days, the project schedule shall be redone within 14 days showing how
the Contractor shall recover the time. A narrative that addresses the changes in the schedule from the previously submitted schedule shall be submitted along with the schedule in both hard copy (appropriate report formats to be determined by Intermountain Representative) and electronic copy. The Contractor shall comply with the most recent schedules.

4.7.12 SCHEDULE CHANGES AND MODIFICATIONS.

(1) **CONTRACT TIME CHANGE REQUIRES MODIFICATION.** The Contract Time may only be shortened or extended by a written modification fully executed by Intermountain.

(2) **CONTRACTOR CHANGING ACTIVITY DURATIONS.** Should the Contractor, after approval of the complete detailed construction schedule, desire to change his plan of construction, he shall submit his requested revisions to Intermountain and the 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 shall 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 the Contractor to discuss the differences.

(3) **CHANGES IN CONTRACT TIME.** The critical path schedule as the term is used in the provisions herein shall be based on the current version of the Contractor’s schedule for the Project and accepted by Intermountain just prior to the commencement of the modification, asserted delay, suspension or interruption. If the Contractor believes it is entitled to an extension of Contract Time under the Contract Documents, the Contractor shall submit a PCO in accordance with Article 7.2 to the A/E and Intermountain Representative accompanied by an analysis of the requested time adjustment.

4.7.13 EXCUSABLE DELAY

(1) **IN GENERAL.** If the Contractor is delayed at any time in the progress of the Work on the critical path schedule by an act or neglect of Intermountain or other causes beyond the Contractor’s control or by other causes which Intermountain determines may justify delay, then the Contract Time shall be extended by Change Order. The Contractor shall immediately take all steps reasonably possible to lessen the adverse impact of such delay. Notwithstanding the above, to the extent any of the causes for delay were caused by the Contractor, reasonably foreseeable by the Contractor or avoidable by the Contractor, then to such extent the delay shall not be cause for extension of the Contract Time. For purposes of this paragraph, Contractors shall include all subcontractors and others under the responsibility of the Contractor.

The determination of the total number of days’ extension will be based upon the current construction schedule in effect at the inception of the change and/or delay and upon all data relevant to the extension as it exists in the project record. Once approved, such data shall be incorporated in the next monthly update of the schedule.
Contractor acknowledges and agrees that delays in work items which, according to the schedule analysis, do not affect any milestone dates or the Contract completion dates shown on the CPM at the time of the delay, will not be the basis for a contract extension.

(2) **WEATHER-RELATED EXCUSABLE 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 out of doors. The Contractor acknowledges that it may lose days due to weather conditions. Contract time may be extended at no cost to Intermountain if all of the following are met which must be established by the Contractor:

(a) 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;

(b) There are no concurrent delays attributed to the Contractor;

(c) 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

(d) 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.

**4.7.14 COMPENSABLE DELAY, SUSPENSION OR INTERRUPTION**
(1) **BASIC CONDITIONS.** In addition to the other requirements of the Contract Documents, a compensable delay, suspension or interruption of the work occurs only when the following are met:

(a) Is wholly unanticipated by the parties at the time of execution of the Contractor’s Agreement or is caused by the breach of a fundamental obligation of the Contract Documents attributable to Intermountain; and

(b) The Contractor delivers a written notice to A/E and Intermountain within seven (7) days that the Contractor knows or should have known of the condition giving rise to the purported compensable delay, disruption, suspension or interruption, and said continuation affects the Contract Time as indicated by the last submitted and reasonable critical path schedule.

(2) **COMPENSABLE DELAY FORMULA.** To the extent of the compensable delay, the Contractor’s total entitlement for all compensable delay damages is the computed result of the following formula: Contract Sum divided by Contract Time (in calendar days); the result of which is then multiplied by 0.05; and the result of which is multiplied by the number of calendar days of compensable days allowed under these General Conditions that are beyond the Contract Time. Notwithstanding any other provision of these General Conditions or the Contract Documents, to the extent the Contractor is entitled to receive the 10% or 15% markup under Article 7.4, this provision shall be inapplicable and the markup shall be deemed to include all the compensable delay damages provided by this paragraph.

(3) **PERIOD OF COMPENSABLE DELAY, SUSPENSION OR INTERRUPTION.** The length and extent of compensable delay, shall be determined, with the use of the Project’s critical path schedule, by ascertaining the number of additional days to the Contract Time that are needed in order to perform the Work in accordance with the Contract Documents as a result of the continuation of the aforesaid delay, disruption, suspension or interruption after receipt of the written notice received by the A/E and Intermountain under Section 4.7.14(1)(b) above.

(4) **CONCURRENT DELAY.** Notwithstanding any other provision of these General Conditions, to the extent a non-compensable delay occurs at the same time as a compensable delay, Intermountain shall not be responsible for any compensation for the period of the non-compensable delay.

4.7.15 **TIME EXTENSION REQUEST.** Any time extension shall be requested within 21 days after the Contractor knew or should have known about the delay and shall be supported by the critical path schedule analysis.

4.7.16 **LIQUIDATED DAMAGES**

(1) **IN GENERAL.** Should the Contractor fail to complete the Work within the Contract Time, there shall be deducted from any amount due or that may become due the Contractor, the sum, if any, stated in the Contractor’s Agreement. Such sum is fixed and agreed upon by Intermountain and Contractor as liquidated damages due Intermountain by reason of the inconvenience and added costs of administration, engineering, supervision and other costs resulting from the Contractor’s default, and not as a penalty. Actual damages related to delay cannot be ascertained at the time of execution of the Contract. To the extent that the liquidated
damages exceed any amounts that would otherwise be due the Contractor, the Contractor shall be liable for such excess to Intermountain. Intermountain may seek enforcement of such obligation by legal action, and if such is necessary, shall recover the related costs and attorney fees. Notwithstanding any other provision of these General Conditions, the availability of liquidated damages to Intermountain shall not limit Intermountain’s right to seek damages or other remedies available under law or equity to the extent such damages or remedies are not based upon delay.

(2) **NO WAIVER OF INTERMOUNTAIN’S RIGHTS.** Permitting the Contractor to continue any part of the Work after the time fixed for completion or beyond any authorized extension thereof, shall 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”**. The Contractor shall 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 aforesaid items shall be available to the A/E and shall be delivered to the A/E for submittal to Intermountain upon completion of the Work, signed by the Contractor, certifying that they show complete and exact “as-built” conditions, stating sizes, kind of materials, vital piping, conduit locations and similar matters. All notes of encountered or changed conditions shall 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 shall demonstrate, for those portions of the Work for which the submittal is required, the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.

4.9.2 **PROMPTNESS**. The Contractor shall review, approve and submit to the 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**. The Contractor shall 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 the A/E. Such Work shall 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, the Contractor represents that the 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**. The Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the A/E’s approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor
has specifically informed the A/E in writing of such deviation at the time of the submittal and the A/E has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the A/E’s review and comment.

4.9.6 DIRECT SPECIFIC ATTENTION TO REVISIONS. The Contractor shall direct specific attention in writing to all revisions on resubmitted Shop Drawings, Product Data, Samples or similar submittals, except those requested by the A/E and indicated on previous submittals.

4.9.7 INFORMATIONAL SUBMITTALS. Informational submittals upon which the 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 shall be entitled to rely upon the accuracy and completeness of such calculations and certifications. If a professional stamp is required, the professional shall be licensed in the State of Utah unless otherwise approved by Intermountain in writing. Likewise, the Contractor is entitled to rely upon the accuracy and completeness of the calculations made by the 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. The Contractor shall confine operations at the site to areas permitted by the Contract Documents, law, ordinances, resolutions, rules and regulations, and permits and shall not unreasonably encumber the site with materials or equipment. Contractor shall take all reasonable means to secure the site, protect the site and protect the Work from any damage. The site shall be left free and clear of refuse, equipment, materials, etc. and the site shall not be subject to spilled liquids and chemicals, toxic or otherwise. Should such an incident occur while the Contractor has control of the site, the Contractor shall 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.

4.10.2 ACCESS TO NEIGHBORING PROPERTIES. The Contractor shall 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. The Contractor shall provide Intermountain and A/E access to the Work in preparation and progress, wherever located.

4.12 ROYALTIES AND PATENTS. The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of patent rights and shall hold Intermountain and A/E harmless from loss on account thereof, but shall 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 the Contractor has reason to believe that the required design, process or product is an infringement of a patent, the Contractor
shall be responsible for such loss unless such information is promptly furnished to Intermountain in writing.

4.13 INDEMNIFICATION

4.13.1 IN GENERAL

(1) To the fullest extent permitted by law, the Contractor shall 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, damages, losses and expenses, including but not limited to attorneys’ fees, and including those events covered under the blanket Contractual Liability Coverage required under the Contract Documents, arising out of or resulting from any act or omission in the performance of the Work including the work of all the Subcontractors and their employees, provided that any such claim, damage, loss or expense is caused in whole or in part by the negligent or wrongful act or omission of the Contractor, any Subcontractor, and their employees, provided that any such claim, damage loss or expense is caused in whole or in part by the negligent or intentional act or omission of the Contractor, any Subcontractor, or anyone directly or indirectly employed or the agent of any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. The Contractor shall defend all actions brought upon such matters to be indemnified hereunder and pay all costs and expenses incidental thereto, but Intermountain shall have the right, at its option, to participate in the defense of any such action without relieving the Contractor of any obligation hereunder. Notwithstanding any of the above, to the extent the Contractor is complying with a written directive from Intermountain that is not based on the Contractor’s recommendation, the Contractor shall not be held liable under the indemnification provision of this Agreement if the Contractor has promptly disagreed with the written directive by delivering such objection to Intermountain in writing.

(2) Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person under Contract Documents.

(3) In claims against any person or entity indemnified under this Article 4.13 by an employee of the Contractor, Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Article 4.13 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers’ or workmen’s compensation acts, disability benefits acts or other employee benefit acts.

(4) 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 these General Conditions. Contractor shall require similar waivers from its Subcontractors, Subconsultants, and agents at any tier.

ARTICLE 5
SUBCONTRACTORS
5.1 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.1.1 APPROVAL REQUIRED

(1) Listing of Subcontractors shall be as stated in the Contract Documents, including but not limited to the “Intermountain Subcontractors List Form”.

(2) The Contractor shall not contract with a proposed person or entity to whom Intermountain has made a reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

5.1.2 BUSINESS AND LICENSING REQUIREMENTS. All Subcontractors used by the Contractor shall comply with all applicable business and licensing requirements.

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

(1) Intermountain will pay the additional costs for an Intermountain requested change in subcontractor if all of the following are met:

(a) If Intermountain in writing requests the change of a subcontractor;

(b) The original subcontractor is a responsible subcontractor that meets the requirements of the Contract Documents; and

(c) The original subcontractor did not withdraw as a subcontractor on the project.

(2) In all other circumstances, the Contractor shall 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 the Contractor to have subcontractors at any tier be required to have a performance and/or payment bond.

5.2 SUBCONTRACTUAL RELATIONS

5.2.1 COMPLY WITH CONTRACT DOCUMENTS. By appropriate enforceable agreement, and to the extent it can be practically applied, the Contractor shall require each Subcontractor to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes towards Intermountain and A/E.

5.2.2 RIGHTS. Each Subcontractor agreement shall 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 shall allow to the Subcontractor, unless specifically provided otherwise in the Subcontractor agreement, the
benefit of all rights and remedies against the Contractor that the Contractor, by the Contract Documents, has against Intermountain.

5.2.3 SUB-SUBCONTRACTORS. The Contractor shall 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 hereinafore.

5.2.4 DOCUMENT COPIES. The Contractor shall make available to each proposed Subcontractor, prior to execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound. Subcontractors shall similarly make copies of applicable portions of the Contract Documents available to their respective proposed Subcontractors.

5.3 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.3.1 CONDITIONS FOR ASSIGNMENT TO INTERMOUNTAIN. Each subcontract agreement for a subcontractor at any tier for a portion of the Work is assigned by the 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 shall be equitably adjusted to meet the new conditions of the work.

ARTICLE 6
PROTECTION OF PERSONS AND PROPERTY

6.1 SAFETY OF PERSONS AND PROPERTY

6.1.1 CONTRACTOR RESPONSIBILITY. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take all reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

1. Employees on the Work and other persons who may be affected thereby;
2. The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or a Subcontractor; and
3. 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. The Contractor shall institute a safety program at the start of construction to minimize accidents. Said program shall 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. The Contractor shall post signs, erect barriers, and provide those items necessary to implement the safety program. As soon as the Contractor proceeds with the Work, the Contractor shall 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. The Contractor shall post a sign in a conspicuous location indicating the necessity of wearing hard hats and the Contractor shall loan such hats to visitors.

6.1.3 COMPLIANCE WITH LAWS. The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss. In particular, the Contractor shall comply with all applicable provisions of Federal, State and municipal safety laws, rules and regulations as well as building codes to prevent accidents or injury to persons on, about, or adjacent to the premises where the Work is being performed.

6.1.4 ERECT AND MAINTAIN SAFEGUARDS. The Contractor shall 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, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

6.1.6 PROMPT REMEDY. The Contractor shall 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 the 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 the Contractor is responsible under said 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 the A/E or Intermountain. The foregoing obligations of the Contractor are in addition to the Contractor’s obligations under the Contract Documents.

6.1.7 SAFETY DESIGNEE. The Contractor shall designate a responsible member of the Contractor’s organization at the site whose duty shall be the prevention of accidents, damage, injury or loss. This person shall be the Contractor’s superintendent unless otherwise designated by the Contractor in writing to Intermountain and A/E.

6.1.8 LOAD SAFETY. The Contractor shall 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, the Contractor shall, 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. The Contractor shall 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, the Contractor shall act, at the Contractor’s discretion, to prevent threatened damage, injury or loss. Contractor shall promptly notify Intermountain Representative of the action taken.
6.2 **HAZARDOUS MATERIALS.** In the event the 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, the Contractor shall 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 shall 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 the Contractor, the Contractor shall not be required to perform without the Contractor’s consent, any Work relating to asbestos, polychlorinated biphenyl (PCB) or any other hazardous waste or substance. Intermountain shall procure a licensed abatement contractor qualified to remove the hazardous material. The abatement contractor shall submit notification of demolition to the Utah Division of Air Quality. Abatement contractor shall pay the notification fee. A copy of the hazardous material survey report shall be available to all persons who have access to the construction site.

6.3 **HISTORICAL AND ARCHEOLOGICAL CONSIDERATIONS.** In the event the 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, the Contractor shall cease any work that would interfere with such discovery and immediately report the condition to the Intermountain Representative and A/E by phone with a follow-up document in writing. Work shall 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 the Contractor fails in any of its obligations in Articles 6.1 through 6.3 above, the Contractor shall be liable to any damages to Intermountain or any third party resulting from such noncompliance. The Contractor shall also be liable for any mitigation or restoration effort resulting from such noncompliance. To the extent all the following is met, the 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 the 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 The 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.

**ARTICLE 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. The Contractor must have a written Modification executed by Intermountain under this Article 7 prior to proceeding with any Work sought to be an extra.

7.1.2 BY WHOM ISSUED. A Change Order or Construction Change Directive shall be issued by Intermountain Representative. An ASI is issued by the A/E. The A/E shall 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 shall be performed under applicable provisions of the Contract Documents, and the Contractor shall 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 proposed Change Order 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 SPECIAL NOTICES REQUIRED IN ORDER TO BE ELIGIBLE FOR ANY CONTRACT MODIFICATION. In order to be eligible for any Modification under this Article 7, the Contractor must have met the following special notice requirements:

1. CONCEALED OR UNKNOWN CONDITIONS. The Contractor must file a written notice with Intermountain Representative within seven (7) calendar days of that the Contractor knew or should have known of a site condition described below or the Contractor shall be deemed to waive any right to file any PCO or Claim for additional monies or time related to such condition:

   a) If the Contractor encounters unknown and reasonably unforeseeable subsurface or otherwise concealed physical conditions, including hazardous or historical/cultural materials under Article 6, which differ materially from those indicated by the Contract Documents or a site inspection; or

   b) If the Contractor encounters unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents.

2. INCREASE IN CONTRACT TIME. If the Contractor encounters a situation in which the Contractor knows or should have known that such situation would cause a delay, disruption, interruption, suspension or the like to the Project, the Contractor must file a
notice with the Intermountain Representative within seven (7) working days of when the Contractor knew or should have known of such circumstance or the Contractor shall be deemed to waive any right to file any PCO or Claim for additional monies or time related to such circumstance. To the extent Intermountain is damaged by the failure of the Contractor to provide such notice after the Contractor knows or should have known of such circumstance, the Contractor shall be liable for damages attributable thereto in addition to any liquidated damages (if applicable).

7.2 CONTRACTOR INITIATED REQUESTS

7.2.1 THE REQUEST FOR INFORMATION, RFI, PROCESS AND TIME TO FILE. The Contractor may file an RFI with the A/E regarding any concern which will assist the Contractor in the proper completion of the Work including, but not limited to issues related to the Contract Documents, plans and specifications. The RFI shall be filed with the 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 (“PCO”). Within twenty-one (21) days after the Contractor knows or should have known of a situation or concern where the Contractor is going to request additional monies or time, the Contractor must file a Proposed Change Order (“PCO”) with Intermountain Representative, or the Contractor shall be deemed to waive any right to claim additional monies or time related to such situation or concern. The PCO shall include all available documentation supporting the PCO available to the Contractor at the time of filing and the Contractor shall thereafter diligently pursue the supplementation(s) of such documentation and promptly deliver such supplementation(s) to Intermountain Representative.

(1) INTERMOUNTAIN REPRESENTATIVE RESPONSE. One of the following may occur after a PCO is filed with Intermountain Representative:

(a) Intermountain Representative, after considering any input by the A/E, may reach an agreement with the Contractor and issue a Change Order.

(b) Intermountain, after considering any input by the A/E, may issue a Construction Change Directive.

(c) If Intermountain Representative, after considering any input by the A/E, disagrees with the Contractor’s PCO, Intermountain representative may seek additional information or verification from the Contractor, the A/E or other sources, may negotiate with the Contractor, may issue a Change Order upon such later agreement, may retract the PR, or may issue a Construction Change Directive. The 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 the 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 shall provide a time limit for the Contractor to file a response with the A/E and Intermountain Representative. If a proposal is not timely provided by the Contractor, Intermountain may calculate the Change Order under Article 7.4.2 below. Upon such timely receipt of the proposal, one of the following shall occur:
7.3.1 IF AGREEMENT, CHANGE ORDER ISSUED. Intermountain Representative, after considering any input by the A/E, may reach an agreement with the Contractor and issue a Change Order.

7.3.2 IF DISAGREEMENT. If the Intermountain Representative disagrees with the Contractor’s proposal, after considering any input from the A/E, Intermountain representative may seek additional information or verification from the Contractor or other sources, may negotiate with the 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, the Contractor must initiate the Claim resolution process provided for herein within twenty-one (21) days of the Contractor’s receipt of the Construction Change Directive, or the Contractor shall 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 shall entitle Intermountain to convert the Construction Change Directive into a Change Order, whether or not executed by the 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 shall not accrue until such time as Intermountain has conveyed to the 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 shall be based on the mutual agreement of the 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 shall 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 shall be limited to the following:

1. 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;

2. Costs of materials, on-site temporary facilities, supplies and equipment (except hand tools) required for or incorporated into the work;

3. Rental costs of machinery, equipment, tools (except hand tools), and on-site temporary facilities, whether rented from the Contractor or others;

4. Costs of permits and other fees, sales, use or similar taxes related to the Work;

5. Additional costs of field supervision and field office personnel directly attributable to the change; and
(6) Overhead and profit by the following liquidated formula which is not a penalty but a reasonable calculation agreed upon at the time of execution of the Contractor’s Agreement, and provided by formula herein due to the fact that the actual amount due for said overhead and profit cannot easily be ascertained at the time of such execution. The markups in 7.4.2(6)(a) and (b) below are to cover the Contractor’s additional payment and performance bond premiums, insurance premiums not specified under Paragraph 7.4.2(1), home office and on-site overhead and profit. Overhead and profit includes, but is not limited to the Contractor’s Project Manager and Cost Estimator. Each request for pricing shall stand on its own and not be combined with other requests for pricing in determining the allowed markup described below. A particular request for pricing shall 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 under the following formula:

- (a) A markup of 15% shall be applied to the cost of each individual charge up to $20,000 in cost, but in no case shall the markup be less than $150;
- (b) A markup of 10% shall be applied to the portion of the cost of each individual charge in excess of $20,000;
- (c) Subcontractors at any tier shall be entitled to markup their costs related to a Change Order with the same percentages as specified in Paragraphs 7.4.2(6)(a) and (b) above, except that the minimum markup shall be $50 for any individual change.

7.4.3 CREDITS. The amount of credit to be allowed by the Contractor to Intermountain for a deletion or change which results in a net decrease in the Contract Sum shall 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 shall indicate the timeframe(s) in which further information is to be provided to resolve the matter. At any time that Intermountain and the Contractor agree upon the time and money related to a Construction Change Directive, a Change Order shall 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, the Contractor shall 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 shall pay any undisputed amount to the Contractor.
7.6 **A/E’S SUPPLEMENTAL INSTRUCTION** (Commonly referred to as an “ASI”). The A/E may at any time that is consistent with maintaining the quality, safety, time, budget and function of the Work, issue to the Contractor a supplemental instruction (“ASI”) after approval from Intermountain Representative is obtained. The Contractor must file with Intermountain Representative a PCO under Paragraph 7.2.2 above, within 21 calendar days of the Contractor’s receipt of the ASI, or the Contractor shall be deemed to have waived any right to additional time or monies as a result of such ASI.

7.8. **RESOLUTION OF CLAIMS.**

7.8.1 **ESCALATION PROCESS.** Each Claim must be submitted to the escalation process and then, if necessary, to judicial action, as described in the following:

(1) The parties involved in the Claim 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 Claim.

<table>
<thead>
<tr>
<th>Levels and Representatives</th>
<th>Allotted Time Period from Notice or from Previous Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
<td>7 days</td>
</tr>
<tr>
<td>Contractor: Managing Principal</td>
<td></td>
</tr>
<tr>
<td>Intermountain: the Director</td>
<td></td>
</tr>
<tr>
<td><strong>Level 2</strong></td>
<td>10 days</td>
</tr>
<tr>
<td>Associate Vice President or higher level executive</td>
<td></td>
</tr>
</tbody>
</table>

7.8.2 **JUDICIAL ACTION.** If any Claim cannot be resolved through the escalation process described above, the matter will be resolved through judicial action 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 jurisdiction and venue of such courts for the purposes hereof.

7.8.3 **CONTRACTOR REQUIRED TO CONTINUE PERFORMANCE.** Pending the final determination of the Claim, including any judicial review or appeal process, and unless otherwise agreed upon in writing by the Director, the Contractor shall proceed diligently with performance of the Contract and Intermountain shall continue to make payments in accordance with the Contract Documents.
7.9 PAYMENT OF CLAIM

7.9.1 When a standalone component of a Claim has received a final determination, and is no longer subject to review or appeal, that amount shall be paid in accordance with the payment provisions of the Contract Documents or judicial order.

7.9.2 When the entire Claim has received a final determination, and is no longer subject to review or appeal, the full amount shall be paid within fourteen (14) days of the date of the final determination unless the work or services has not been completed, in which case the amount shall be paid in accordance with the payment provisions of the Contract Documents to the point that the work or services is completed.

7.9.3 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.

7.9.4 Any final determination where the Intermountain is to pay additional monies to the Contractor shall 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.

7.9.5 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.

7.9.6 Payment to the Contractor for a Subcontractor issue (Claim) deemed filed by the Contractor, shall be paid by the Contractor to the Subcontractor in accordance with the contract between the Contractor and the Subcontractor.

7.9.7 The execution of a customary release document related to any payment may be required as a condition of making the payment.

7.10 ALLOCATION OF COSTS OF CLAIM RESOLUTION PROCESS

7.10.1 Except for attorneys’ fees, and unless otherwise agreed to by the parties to the Claim, the costs of resolving the Claim shall 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.

7.10.2 The prevailing Party in any Claim, judicial action or other proceeding is entitled to recover its reasonable attorneys’ fees, other fees, and costs incurred in the proceeding, in addition to any other relief to which that Party may be entitled.

7.11 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.

ARTICLE 8
PAYMENTS AND COMPLETION
8.1 SCHEDULE OF VALUES. With the first Application for Payment, the Contractor shall submit to the A/E and Intermountain Representative a schedule of values allocated to all the various portions of the Work. The Schedule of Values shall be submitted on the form approved and provided by Intermountain. The A/E shall make recommendations to the Intermountain Representative regarding the Schedule of Values including any suggested modifications. When approved, including any approved modifications, by Intermountain Representative, it shall be the basis for future Contractor Applications for Payments. The Contractor shall 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 shall be met:

(1) The Contractor shall submit to the 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. The Application for Payment shall be on a special form approved and provided by Intermountain.

(2) Such application shall be supported by such data substantiating the Contractor’s right to payment as Intermountain or A/E may require. Said data may include, but is not limited to, copies of requisitions from Subcontractors.

(3) Such applications may include requests for payment pursuant to approved Change Orders or Construction Change Directives.

(4) Such applications may not include requests for payment for portions of the Work performed by a subcontractor when the Contractor does not intend to pay to a Subcontractor because of a dispute or other reason.

(5) In executing the Application for Payment, the Contractor shall attest that subcontractors involved with prior applications for payment have been paid, unless the Contractor provides a detailed explanation why such payment may not have occurred. Intermountain reserves the right to require the 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 shall 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 shall be conditioned upon compliance by the Contractor with procedures satisfactory to Intermountain to establish Intermountain’s title to such materials and equipment or otherwise protect Intermountain’s interest, and shall 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. The Contractor warrants that title to all Work covered by an Application for Payment will pass to Intermountain no later than the time for payment. The 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 shall, to the best of the Contractor’s knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the 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 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 the Contractor hereunder if and for so long as the Contractor fails to perform any of its obligations hereunder or otherwise is in default under any of the Contract Documents.

8.3 CERTIFICATES FOR PAYMENT

8.3.1 ISSUED BY A/E. The A/E shall within ten (10) days after receipt of the Contractor’s Application for Payment, either issue to Intermountain a Certificate for Payment, with a copy to the Contractor, for such amount as the A/E determines due, or notify the Contractor and Intermountain in writing of the A/E’s reasons for withholding certification in whole or in part as provided in Paragraph 8.4.1. If the A/E fails to act within said ten (10) day period, the Contractor may file the Application for Payment directly with Intermountain Representative and Intermountain will thereafter have twenty (20) days from the date of Intermountain’s receipt to resolve the amount to be paid and to pay the undisputed amount. The accuracy of the Contractor’s Applications for Payment shall be Contractor’s responsibility, not A/E’s.

8.3.2 A/E’S REPRESENTATIONS. The A/E’s issuance of a Certificate for Payment shall constitute a representation to Intermountain that to the best of the A/E’s knowledge, information and belief, based upon the 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 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 prior to completion and to specific qualifications expressed by the A/E. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment shall not be a representation that the 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 the Contractor’s right to payment, (d) ascertained how or for what purpose the Contractor used money previously paid on account of Contract Sum, or (e) any duty to make such inquiries.

8.4 DECISIONS TO WITHHOLD CERTIFICATION

8.4.1 WHEN WITHHELD. The 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 the A/E’s judgment the representations to Intermountain required in Paragraph 8.3.2 above cannot be made. If the A/E is unable to certify payment in the amount of the Application, the A/E shall notify the Contractor and Intermountain as provided in Paragraph
above. If the Contractor and A/E cannot agree on a revised amount, the A/E shall promptly issue a Certificate for Payment for the amount to which the A/E makes such representations to Intermountain. The 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 the A/E’s opinion to protect Intermountain from loss because of:

(1) Defective Work not remedied;
(2) Third party claims filed or reasonable evidence indicating probable filing of such claims;
(3) Failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
(4) Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
(5) Damage to Intermountain or another contractor;
(6) Reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
(7) 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 the Contractor disputes any determination by the A/E or the result of the Claim resolution process with regard to any Certification of Payment, the Contractor nevertheless shall expeditiously continue to prosecute the Work.

8.4.4 INTERMOUNTAIN NOT IN BREACH. Intermountain shall 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

(1) Except as provided in Paragraph 8.3.1, Intermountain shall pay any undisputed amount within sixty (60) days of the date that the application for payment was submitted to the A/E. In no event shall Intermountain be required to pay any disputed amount.

(2) 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 shall 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. The Contractor shall promptly pay each Subcontractor, upon receipt of payment from Intermountain, out of the amount paid to the Contractor on account of such Subcontractor’s portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, 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. The A/E or Intermountain shall, on request, furnish to the Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the 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 shall 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 shall 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 the Contractor and certification by the A/E, Intermountain shall 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 the 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 the Contractor considers a portion to be substantially complete, the Contractor shall prepare and submit a list to the A/E as previously provided for herein. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. Contractor shall have continuing responsibility to protect the unoccupied portions of the site and the Work during such partial occupancy and shall 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 shall be determined by written agreement between Intermountain and Contractor.
8.7.2 INSPECTION. Immediately prior to such partial occupancy or use, Intermountain, Contractor and A/E shall 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 shall not constitute acceptance of Work not complying with the requirement of the Contract Documents.

8.8 FINAL PAYMENT

8.8.1 CERTIFICATE FOR PAYMENT. The A/E’s final Certificate for Payment shall constitute a further representation that the conditions listed in Paragraph 8.8.2 as precedent to the 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 shall become due until the Contractor submits to the A/E the following to the extent required by Intermountain Representative:

1. 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;

2. 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 30 days prior written notice, by certified mail, return receipt requested, has been given to Intermountain;

3. A written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents;

4. If requested by surety in a timely manner or by Intermountain, consent of surety, to final payment;

5. Receipt of Record Drawings, 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;

6. 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, the Contractor shall refund to Intermountain all money that Intermountain may be compelled to pay in discharging such lien, including all costs and reasonable attorneys’ fees; and

7. A written statement demonstrating how the Contractor will distribute interest earned on retention to Subcontractors as required by Section 13.8.5, U.C.A.

8.8.3 WAIVER OF CLAIMS: FINAL PAYMENT. The making of final payment shall constitute a waiver of Claims by Intermountain except those arising from:
8.8.4 DELAYS NOT CONTRACTOR’S FAULT. If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, Intermountain shall, upon application by the Contractor and certification by the A/E, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims. Unless otherwise stated by Intermountain in writing, the making of final payment shall constitute a waiver of claims by Intermountain as provided in Paragraph 8.8.3 for that portion of that Work fully completed and accepted by Intermountain.

8.8.5 WAIVER BY ACCEPTING FINAL PAYMENT. Acceptance of final payment by the Contractor or a Subcontractor shall 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. Such waivers shall be in addition to the waiver described in Paragraph 8.8.3.

ARTICLE 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 shall be made at an appropriate time. Unless otherwise specifically set forth in the Contract Documents or agreed to by Intermountain in writing, Intermountain shall contract for such tests, inspections and approvals with an independent entity, or with the appropriate public authority, and Intermountain shall 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, the Contractor shall, at least two working days prior to the time of the desired inspection, and following the procedures established by Intermountain, request such inspection or approval to be performed. The Contractor shall give the A/E timely notice of when and where tests and inspections are to be made so that the A/E may observe such procedures.

9.1.2 FAILURE OF AN INSPECTOR TO APPEAR. Work shall not proceed without any required inspection and the associated authorization by Intermountain to proceed unless the following procedures and requirements have been met:
(1) The inspection or approval was requested in a timely manner as provided in Paragraph 9.1.1;

(2) The Contractor received written confirmation from the inspection entity that the inspection was scheduled;

(3) The Contractor has contacted or attempted to contact the inspector to confirm that the inspector is unable to perform the inspection as scheduled;

(4) If the inspector has confirmed that it is unable to perform the inspection as scheduled or if the Contractor is unable to contact the inspector, the contractor shall attempt to contact the Intermountain Representative for instruction; and the Contractor has documented the condition of the work prior to 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, the Contractor shall 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 shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the A/E.

9.1.5 A/E OBSERVING. If the A/E is to observe tests, inspections or approvals required by the Contract Documents, the A/E shall 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 shall be made promptly to avoid unreasonable delay in the Work.

9.2 INSPECTIONS: SUBSTANTIAL AND FINAL

9.2.1 SUBSTANTIAL COMPLETION INSPECTION. Prior to requesting a substantial completion inspection, the Contractor shall 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 the Contractor with written comments. If Intermountain determines that the initial punchlist indicates that the Project may be substantially complete, the A/E shall promptly organize and perform a Substantial Completion inspection in the presence of Intermountain and all appropriate authorities.

(1) If the A/E reasonably determines that the initial punchlist prepared by the Contractor substantially understates the amount of the Work remaining to be completed and the Project is not substantially complete, the A/E shall report this promptly to Intermountain, and upon concurrence of Intermountain, the Contractor will be assessed the costs of the inspection and punchlist preparation incurred by the A/E and Intermountain.
(2) When the Work or designated portion thereof is Substantially Complete, the A/E shall prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion; shall establish responsibilities of Intermountain and Contractor for security, maintenance, heat, utilities, damage to the work and insurance; and shall fix the time within which the Contractor shall finish all items on the punchlist accompanying the Certificate. The Certificate of Substantial Completion shall require approval by Intermountain Representative. If there is a punchlist, the Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on the punchlist does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

(3) Warranties required by the Contract Documents shall 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 shall state the length of the warranty, which must comply with the Contract Documents.

(4) The Certificate of Substantial Completion shall be submitted by the A/E to Intermountain and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

(5) Except to the extent Intermountain Representative otherwise approves in advance and in writing, the Contractor shall submit the following documents in order to achieve Substantial Completion: written warranties, guarantees, operation and maintenance manuals, and all complete as-built drawings. The Contractor must also provide or obtain any required approvals for occupancy. The 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. Prior to requesting a final inspection, the Contractor shall verify all punchlist items are corrected/completed. Once all punchlist items are corrected/completed the Contractor shall notify Intermountain and request a final inspection. Intermountain shall notify the 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 the Contractor, authorized by the 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 prior to an Inspector’s approval to proceed, it must be uncovered for the Inspector’s inspection and be replaced at the Contractor’s expense without change in the Contract Time.

9.3.2 OBSERVATION PRIOR TO COVERING. Except as provided in Paragraph 9.3.3, if Intermountain or the A/E has requested in writing to observe conditions prior to any Work being covered or if such observation is specified in the Contract Documents, and the Work is covered without such observation, the Contractor shall be required to uncover and appropriately replace the Work at the Contractor’s expense without change in the Contract Time. If the Contractor requests an inspection and Intermountain or A/E, including any inspector of
each, does not appear, the Contractor shall immediately notify Intermountain of such lack of appearance, but shall 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 the Contractor without an inspection as provided in Paragraph 9.1.2 or if a portion of the Work has been covered which the A/E or Intermountain has not specifically requested to observe prior to its being covered or such observation is not specified by the Contract Documents, the A/E or Intermountain may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement, shall, by appropriate Change Order, be charged to Intermountain. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by Intermountain or a separate contractor in which event Intermountain shall be responsible for payment of such costs.

9.4 CORRECTION OF WORK AND GUARANTY PERIOD

9.4.1 CONTRACTOR CORRECT THE WORK. The Contractor shall correct Work rejected by the 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. The Contractor shall bear the costs of correcting such rejected Work, including additional testing and inspections and compensation for the 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, the Contractor shall correct it promptly after receipt of written notice from Intermountain to do so unless Intermountain has previously given the Contractor a written acceptance of such condition. The period of one year shall 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 the Contractor under this Paragraph 9.4.2 shall 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 shall give notice of observed defects with reasonable promptness, however, failure to give such notice shall not relieve the Contractor of its obligation to correct the Work at the cost that the Contractor would have incurred if Intermountain did so report with reasonable promptness. All corrected Work shall be subject to a one-year guaranty period the same in all respects as the original Work, except that such guaranty period shall 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

(1) The Contractor shall promptly remove from the premises all Work that Intermountain and/or the A/E determines as being in nonconformance with the Contract Documents, whether incorporated or not.

(2) The Contractor shall promptly replace and re-execute the Work in accordance with the Contract Documents and without expense to Intermountain.

(3) The Contractor shall 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.

(4) If the 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 the Contractor.

(5) If the 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 shall be construed to establish a period of limitation with respect to other obligations which the 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 the 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 the Contractor’s liability with respect to the 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 shall apply:

(1) The 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.

(2) The 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 said requirements, including substitutions not properly approved and authorized, may be considered defective at Intermountain’s option.

9.5.2 EXCLUSION. Unless due to the negligent or intentional act or omission of the Contractor or those under the Contractor’s control, or as otherwise stated in the Contract Documents, the Contractor’s guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage.
9.5.3 FURNISH EVIDENCE ON REQUEST. If requested by the A/E or Intermountain, the Contractor shall 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 shall be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 10
INSURANCE AND BONDS

10.1 LIABILITY INSURANCE. To protect against liability, loss and/or expense arising in connection with the performance of services described under the Contract Documents, the Contractor shall obtain and maintain in force during the entire period of Contract Documents without interruption, as part of the Construction Costs for the Project, the following stated insurance from insurance companies authorized to do business in the State of Utah, in a form and content satisfactory to Intermountain. The Contractor shall require all Subcontractors to have and maintain similarly required policies. All of the following listed insurance coverages shall be provided by the Contractor.

10.1.1 CONTRACTOR’S COMMERCIAL GENERAL LIABILITY INSURANCE. The Contractor shall maintain coverage on an occurrence made basis, annual aggregate policy limit based on the following chart, unless modified by mutual agreement of the parties, including coverage for Premises-Operations, Independent Contractors’ Protective, Products-Completed Operations, Contractual Liability, Personal Injury, and Broad-Form Property Damage (including coverage for Explosion, Collapse, and Underground hazards).

- **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 or CM/GC Agreement, as applicable.

Intermountain reserves the right to require additional coverage from that stated in the chart herein above, at Intermountain’s expense for the additional coverage portion only. Intermountain also reserves the right to require project specific insurance, and if such right has been exercised it
shall be indicated in the Contract Documents. Unless project specific insurance is required by Intermountain, the coverage shall be written under a policy with limits applicable to this project only. Products and Completed Operations insurance must be maintained in force for the discovery of claims for the full statute of limitations period under applicable law. The Contractor’s policy must also include contractual liability coverage applicable to the indemnity provision of this Agreement for those portions of the indemnity provisions that are insured under the Contractor’s policy and in accordance with this Agreement, including the attachments hereto.

The Contractor shall collect and keep on-file evidence that Contractor and each Subcontractor has current certificates of this Commercial General Liability Insurance requirement, and produce them upon request by Owner.

10.1.2 WORKERS’ COMPENSATION INSURANCE AND EMPLOYERS’ LIABILITY INSURANCE. Worker’s Compensation Insurance shall cover full liability under the Worker’s Compensation Laws of the jurisdiction in which the Project is located at the statutory limits required by said jurisdiction’s laws. The Contractor shall collect and keep on-file evidence that Contractor and each Subcontractor has current Workers Compensation Insurance, as required by State statute, and produce them upon request by Owner.

10.1.3 AUTOMOBILE. Automobile liability insurance for claims arising from the ownership, maintenance, or use of a motor vehicle. The insurance shall 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.

10.1.4 VALUABLE PAPERS AND RECORDS COVERAGE AND ELECTRONIC DATA PROCESSING (DATA AND MEDIA) COVERAGE. The Contractor and all Subcontractors of the Contractor shall provide coverage for the physical loss of or destruction to their work product including drawings, specifications, and electronic data and media.

10.1.5 AIRCRAFT USE. Contractor using its own aircraft, or employing aircraft in connection with the work performed under the Contract Documents shall maintain Aircraft Liability Insurance with a combined single limit of not less than $1,000,000 per occurrence. Said certificate shall state that the policy required by this paragraph has been endorsed to name Intermountain as an Additional Insured.

10.1.6 POLICY AGGREGATE(S). The Contractor’s policy(ies) shall be endorsed to have General Aggregate apply to this Project only.

10.1.7 CERTIFICATES. Before the Contract Documents are executed, the Contractor shall submit certificates in form and substance satisfactory to Intermountain as evidence of the insurance requirements of this Article. Such certificates shall contain provisions that no cancellation, or non-renewal shall 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. The Contractor shall notify Intermountain within thirty (30) days of any claim(s) against the Contractor which singly or in the aggregate exceed 20% of the applicable required insured limits and the Contractor shall, if requested by Intermountain, use its best efforts to reinstate the policy within the original limits and at a reasonable cost. Intermountain shall 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. Intermountain reserves the right to request the Contractor to provide a
loss report from its insurance carrier.

10.1.8 MAINTAIN THROUGHOUT CONTRACT DOCUMENTS TERM. The
Contractor agrees to maintain all insurance required under the Contract Documents during the
required term. If the Contractor fails to furnish and maintain said required insurance,
Intermountain may purchase such insurance on behalf of the Contractor, and the Contractor shall
pay the cost thereof to Intermountain upon demand and shall furnish to Intermountain any
information needed to obtain such insurance.

10.1.9 WAIVERS OF SUBROGATION. All policies required, except Workers
Compensation Insurance, shall be endorsed to include waivers of subrogation in favor of
Intermountain.

10.1.10 EXCESS COVERAGES. Any type of insurance or any increase of limits of
liability not described in the Contract Documents which the Contractor requires for its own
protection or on account of any statute, rule or regulation, shall be its own responsibility and at
its own expense.

10.1.11 NOT RELIEVE CONTRACTOR OF LIABILITY. The carrying of any
insurance required by the Contract Documents shall in no way be interpreted as relieving the
Contractor of any other responsibility or liability under the Contract Documents or any
applicable law, statute, rule, regulation, or order.

10.1.12 CONTRACTOR COMPLIANCE WITH POLICIES. Contractor shall not
violate or knowingly permit to be violated any of the provisions of the policies on insurance
required under this Agreement.

10.1.13 DEDUCTIBLE LIABILITY. Any and all deductibles in the above described
policies shall be assumed by, for the account of, and at sole risk of Contractor. The allowable
deductible for any of the policies required by these General Conditions shall be no more than
$1,000 or 0.1 percent of the Contract Amount, whichever is greater.

10.1.14 ADDITIONAL REQUIREMENTS

(1) Any type of insurance or any increase of limits of liability not described in
this Agreement which the Contractor requires for its own protection or on account of any
statute, rule or regulation, shall be its own responsibility and at its own expense.

(2) The carrying of any insurance required by this Agreement shall in no way
be interpreted as relieving the Contractor or Subcontractors of any other responsibility or
liability under this Agreement or any applicable law, statute, rule, regulation or order.

(3) Contractor shall not violate or knowingly permit to be violated any of the
provisions of the policies on insurance required under these General Conditions.

10.2 “BUILDER’S RISK” PROPERTY INSURANCE

10.2.1 IN GENERAL. At Intermountain’s option, Intermountain may provide, or may
require Contractor to provide, “Builder’s Risk” property insurance to protect Intermountain, as
well as all Contractors and Subcontractors, and include them as insureds, with respect to Work
performed hereunder at Intermountain’s own cost and expense, according to the policies and forms currently in force with insurance carriers selected by Intermountain.

10.2.2 **DEDUCTIBLE.** The above described “Builders Risk” policies shall be subject to a total deductible of $5,000 per loss occurrence, which shall be assumed by all Contractors or Subcontractors, in proportion to their share of the total amount of an insured loss occurrence.

10.2.3 **WAIVER.** Contractor, including all Subcontractors, and Intermountain hereby waive all rights against each other for damages caused by perils insured against under the “Builder’s Risk” insurance provided by Intermountain and the Contractor each shall require similar waivers from their contractors, subcontractors, sub-consultants and agents, at any tier.

10.2.4 **SPECIAL HAZARDS.** Intermountain shall bear the risk of loss, delay and/or damage due to earthquake and/or flood and may either insure or self-insure that risk. If the Contractor requests in writing that insurance for other special hazards be included in the “Builder’s Risk” policy, Intermountain shall, if possible, include such insurance in the policy and the cost thereof shall be charged to the Contractor by Change Order.

10.3 **PERFORMANCE BOND AND PAYMENT BOND.** If required by the Contract Documents, the Contractor shall 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, on forms provided by Intermountain, and include as part of the quoted total all costs involved in securing and furnishing, the bonds listed below, based on the completed cost of the Contract and effective upon execution of the Contract. Said bonds shall be from surety companies which are authorized to do business in the State of Utah, listed in the U. S. Department of Treasury Circular 570, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, and acting within the limitation listed therein.

10.3.1 A full 100 percent performance bond covering the faithful execution of the Contract in accordance with the Contract Documents; and

10.3.2 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.

10.3.3 Any required insurance required under the U.S. Terrorism Risk Insurance Act of 2002, any similar applicable law, or as such Act may be amended.

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.

**ARTICLE 11**

**MISCELLANEOUS PROVISIONS**

11.1 **A/E’S RESPONSIBILITIES.** These General Conditions are not intended to provide an exhaustive or complete list of the 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. The Contractor shall not assign the Contract without the prior written consent of Intermountain, nor shall the Contractor assign any amount due or to become due as well as any rights under the Contract, without prior written consent of Intermountain.

11.3 **WRITTEN NOTICE.** Written notice shall 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 shall 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 shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall such action or failure to act constitute approval or acquiescence in a breach thereunder, except as any of the above may be specifically agreed to in writing. In no case shall the 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 **COMMENCEMENT OF STATUTORY LIMITATION PERIOD**

11.5.1 **BEFORE SUBSTANTIAL COMPLETION.** Except as provided in 11.5.4 below, as to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion.

11.5.2 **BETWEEN SUBSTANTIAL COMPLETION AND FINAL CERTIFICATION FOR PAYMENT.** Except as provided in Paragraph 11.5.4 below, as to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certification for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certification for Payment.

11.5.3 **AFTER FINAL CERTIFICATION FOR PAYMENT.** Except as provided in Paragraph 11.5.4 below, as to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any guaranty provided under Article 9 the date of any correction of the Work or failure to correct the Work by the Contractor under Paragraph 9.4.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Intermountain, whichever occurs last.
11.5.4 EXCEPTION. Notwithstanding any other provision of this Article 11.5 to the contrary, no applicable statute of limitations shall be deemed to have commenced with respect to any portion of the Work which is not in accordance with the requirements of the Contract Documents, which would not be visible or apparent upon conducting a reasonable investigation, and which is not discovered by Intermountain until after the date which, but for this Paragraph 11.5.4, would be the date of commencement of the applicable statute of limitations; the applicable statute of limitations instead shall be deemed to have commenced on the date of such discovery by Intermountain.

11.6 APPLICABLE LAWS. The applicable laws and regulations of the State of Utah, as well as any applicable local laws and regulations not superseded or exempted by State law, shall govern the execution of the Work embodied in the Contract Documents as well as the interpretation of the Contract Documents.

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 VENUE. In case of any dispute, which may arise under the Contract Documents, the place of venue shall be in the County of Salt Lake, Utah, unless otherwise agreed to by all the parties in writing.

11.9 SEVERABILITY. The invalidity of any part, paragraph, subparagraph, phase, provision or aspect of the Contract documents shall not impair or affect in any manner the validity, enforceability or effect of the remainder of the Contract Documents.

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

11.11 NO THIRD PARTY RIGHTS. These General Conditions create rights and duties only as between Intermountain and Contractor, and Intermountain and A/E. Nothing contained herein shall 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.

ARTICLE 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 the 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, the Contractor, may terminate the Contract in accordance with 12.1.2 herein below for any of the following reasons:
(1) 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;

(2) Issuance of an order of a court or other public authority having jurisdiction which necessitates such termination, except that where the Contractor has standing, the Contractor must cooperate in efforts to stay and/or appeal such order;

(3) An act of government, such as a declaration of national emergency, making material unavailable; or

(4) 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, the 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 prior to the notice of termination.

12.2 TERMINATION BY INTERMOUNTAIN FOR CAUSE

12.2.1 IN GENERAL. Intermountain may terminate the Contract if the 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:

(1) The Contractor persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

(2) The Contractor fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

(3) The Contractor persistently disregards laws, ordinances, or rules, regulations, resolutions or orders of a public authority having jurisdiction; or

(4) The Contractor fails to perform the Work within the time specified in the Contract Documents or any authorized extension thereof or the Contractor fails to make progress with the Work as to endanger such compliance;

(5) The Contractor fails to perform the Work or is otherwise in breach of a material provision of the Contract Documents;

(6) The Contractor fails to respond promptly to the financial responsibility inquiry under the Contractor’s Agreement;

(7) As permissible by law for a reason to terminate, the Contractor is adjudged bankrupt;
(8) As permissible by law for a reason to terminate, the Contractor should make a general assignment for the benefit to creditors;

(9) As permissible by law for a reason to terminate, the Contractor should have a receiver appointed on account of the Contractor’s insolvency; or

(10) The 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

(1) If the 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 shall offset from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the 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 the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to Intermountain. The Contractor shall continue performance of the Contract to the extent not terminated.

(2) Except with respect to defaults of Subcontractors, the Contractor shall not be liable for any excess costs if the failure to perform the Contract arises out of causes beyond the control and without the fault or negligence of the Contractor or anyone for whom the Contractor may be liable. Such causes may include, but are not limited to, acts of God or of the public enemy, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; but in every case the failure to perform must be beyond the control and without the fault or negligence of the Contractor or anyone for whom the Contractor may be liable. If the failure to perform is caused by the default of a Subcontractor, and if such default arises out of causes beyond the control of both the Contractor and the Subcontractor, and without the fault or negligence of either of them or anyone for whom either may be liable, the Contractor shall not be liable for any excess costs for failure to perform unless the supplies or services to be furnished by the Subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery or completion schedule.

12.2.3 ITEMS REQUIRED TO BE TRANSFERRED OR DELIVERED.
Intermountain may require the Contractor to transfer title and deliver to Intermountain, in the manner and to the extent directed by Intermountain:

(1) Any completed portion of the Work; and

(2) Any partially completed portion of the Work and any parts, tools, dies, jigs, fixtures, drawings, information, and contract rights (hereinafter called “construction materials”) as the Contractor has specifically produced or specifically acquired for the
performance of such part of this Contract as has been terminated; and the Contractor shall, upon
direction of Intermountain, protect and preserve property in the possession of the 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 the 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 the A/E’s services and expenses
made necessary thereby, such excess shall be paid to the Contractor. If such cost exceeds the
unpaid balance, the Contractor shall pay the difference to Intermountain this obligation for
payment shall 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 the 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 shall 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 shall 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 the 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 Time shall 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 shall 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 shall be effected by delivery to the 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, the Contractor shall:

(1) Stop work under the Contract on the date and to the extent specified in the notice of termination;

(2) 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;

(3) Terminate all orders and subcontracts to the extent that they relate to performance of Work terminated by the notice of termination;

(4) Assign to Intermountain in the manner, at the times, and to the extent directed by Intermountain, all of the right, title and interest of the Contractor under the orders and subcontracts so terminated, in which case Intermountain shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

(5) 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 shall be final for all the purposes of this Article 12.4;

(6) Transfer title and deliver to Intermountain in the manner, at the times, to the extent, if any, directed by Intermountain:

(a) 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

(b) 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;

(7) 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(6) above; provided, however, that the Contractor:

(a) Shall not be required to extend credit to any purchaser; and

(b) 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 or disposition shall be applied in reduction of any payments to be made by Intermountain to the Contractor under this Contract or shall otherwise be credited to the price or cost of the Work covered by this Contract or paid in such other manner as Intermountain may direct;

(8) Complete performance of such part of the Work as shall not have been terminated by the notice of termination; and
(9) 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 the Contractor in which Intermountain has or may acquire an interest.

12.4.3 AGREED UPON PAYMENT. Subject to the provisions of Paragraph 12.4.3 above, the Contractor and Intermountain may agree upon the amount to be paid to the 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 12.4.4, upon the whole amount to be paid to the Contractor by reason of the termination of Work pursuant to this Article 12.4, Intermountain shall pay to the Contractor the amounts determined by Intermountain as follows, but without duplication of any amounts agreed upon in accordance with Paragraph 12.4.3:

(1) With respect to all Contract Work performed prior to effective date of the notice of termination, the total (without duplication of any items) of:

(a) The cost of such Work including undisputed Claim amounts;

(b) The cost of terminating, settling and paying claims arising out of the termination of Work under subcontracts or orders as provided in Paragraph 12.4.2(5) above, exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by Subcontractors prior to the effective date of the notice of termination under this Contract, which amounts shall be included in the cost on account of which payment is made under Paragraph 12.4.4(1)(a) above;

(c) A sum, as overhead and profit on Paragraph 12.4.4(1) (a) above, determined by Intermountain to be fair and reasonable;

(d) The reasonable cost of the preservation and protection of property incurred pursuant to Paragraph 12.4.2(9); and any other reasonable cost incidental to termination of Work under this Contract, including expenses incidental to the determination of the amount due to the Contractor as the result of the termination of Work under this Contract.

(2) The total sum to be paid to the Contractor under Paragraph 12.4.4(1) above shall not exceed the total Contract Sum as reduced by the amount of payments otherwise made and as further reduced by the Contract price of work not terminated. Except for normal spoilage, and except to the extent that Intermountain shall have otherwise expressly assumed the risk of loss in writing, there shall be excluded from the amounts payable to the Contractor under Paragraph 12.4.4(1) above, the fair value of property which is destroyed, lost, stolen, or damaged so as to become undeliverable to Intermountain, or to a buyer pursuant to Paragraph 12.4.2(7).

12.4.5 DEDUCTIONS. In arriving at the amount due the Contractor under this Article 12.4, there shall be deducted:

(1) All unliquidated advance or other payments on account theretofore made to the Contractor, applicable to the terminated portion of this Contract;

(2) Any Claim which Intermountain may have against the Contractor in connection with this Contract; and
(3) The agreed price for, or the proceeds of sale of, any materials, supplies, or other things acquired by the Contractor or sold, pursuant to the provisions of this Article 13.4, 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 the Contractor in connection with the terminated portion of this Contract whenever, in the opinion of Intermountain the aggregate of such payments shall be within the amount to which the 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 shall be payable by the 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 shall be charged with respect to any such excess payment attributable to a reduction in the 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.

12.4.9 PRESERVE AND MAKE AVAILABLE RECORDS. Unless otherwise provided for in this Contract, or by applicable law, the Contractor shall, 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 the Contractor, but without direct charge to Intermountain, all books, records, documents and other evidence bearing on the costs and expenses of the 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.

12.4.10 INTERMOUNTAIN’S RIGHT TO STOP THE WORK. If the 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 the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Intermountain to stop the Work shall not give rise to a duty on the part of the Intermountain to exercise this right for the benefit of the Contractor or any other person or entity.
INTERMOUNTAIN HEALTHCARE
ACCESS AND CONFIDENTIALITY AGREEMENT

SECTION 1.0 PURPOSE AND DEFINITION

1.1 Purpose of this Agreement. Federal and state laws, as well as Intermountain’s policies, protect Confidential Information, assure that it remains confidential, and permit it to be used for appropriate purposes. Those laws and policies assure that Confidential Information, which is sensitive and valuable, remains confidential. They also permit you to use Confidential Information only as necessary to accomplish legitimate and approved purposes. You need access to Confidential Information because you have one of the following roles:
   A. An Intermountain Workforce member, which includes volunteers (a “Workforce Member”); or
   B. An Intermountain-affiliated or Intermountain-credentialed Provider (a “Provider”), or
   C. A vendor or agent of IHC Health Services, Inc. (a “Vendor” or “Agent”).

1.2 Definition. “Confidential Information” means data proprietary to Intermountain, other companies, or other persons, plus any other information that is private and sensitive which Intermountain has a duty to protect. You may only access Confidential Information through or at communications, paper documents, computer systems, or through your activities at or with Intermountain. Examples of Confidential Information include the following information that is maintained by, or obtained from, Intermountain:
   A. An individual’s demographic, employment, or health information;
   B. Peer-review information;
   C. Intermountain’s business information, (e.g., financial and statistical records, strategic plans, internal reports, memos, contracts, peer review information, communications, proprietary computer programs, source code, proprietary technology, etc.); and
   D. Intermountain’s or a Third-party’s information (e.g., computer programs, client and vendor proprietary information, source code, proprietary technology, etc.).

SECTION 2.0 YOUR DUTIES UNDER THIS AGREEMENT

2.1 Principal Duties. To qualify to access or use Confidential Information, you will comply with the laws and Intermountain policies governing Confidential Information. Your principal duties regarding Confidential Information include, but are not limited to, the following:
   A. Safeguard the privacy and security of Confidential Information;
   B. Use Confidential Information only as needed to perform your legitimate and Intermountain-approved responsibilities. This means, among other things, that you will not:
      1. Access Confidential Information for which you have no legitimate need to know.
      2. Divulge, copy, release, sell, loan, revise, alter, or destroy any Confidential Information except as properly authorized within the scope of your legitimate and Intermountain-approved responsibilities;
      3. Misuse Confidential Information;
   C. Safeguard and not disclose your access code or other authorization that allows you to access Confidential Information. This means, among other things, that you will:
      1. Accept responsibility for all activities undertaken using your access code and other authorization; and
      2. Report any suspicion or knowledge that you have that your access code, authorization, or any Confidential Information has been misused or disclosed without Intermountain’s permission (Report this suspicion or knowledge to the Intermountain Compliance Hotline at 1-800-442-4843, or, if you are a member of Intermountain’s Workforce, to your supervisor or facility compliance coordinator);
   D. Do not access or disclose Confidential Information from an Intermountain facility unless necessary for your legitimate and Intermountain-approved responsibilities (If removal of Confidential Information from an Intermountain facility is necessary, you will use reasonable and appropriate physical and technical safeguards—such as encrypting electronic Confidential Information);
   E. Report activities by any individual or entity that you suspect may compromise the confidentiality of Confidential Information (To the extent permitted by law, Intermountain will hold in confidence reports that are made in good faith about suspect activities, as well as the names of the individuals reporting the activities);
   F. Not use or share Confidential Information after termination of your role triggering the requirement to sign this Agreement (For example, if you are a Workforce Member, when you leave Intermountain’s employment; if you are a Provider, when you lose your privileges at an Intermountain facility or your privileges to access Confidential Information, and if you are a Vendor or Agent, when you finish your assignment or project with Intermountain or when your company stops doing business with Intermountain, whichever is first); and
   G. Claim no right or ownership interest in any Confidential Information referred to in this Agreement.

SECTION 3.0 VIOLATION OF DUTY – CHANGE OF STATUS

3.1 Responsibility. You are responsible for your noncompliance with this Agreement.
3.2 Discipline. If you violate any provision of this Agreement, you will be subject to discipline, including but not limited to, the following:
   A. If you are a Workforce Member, to dismissal as a member of Intermountain’s Workforce, loss of employment with Intermountain, termination of your ability to access Confidential Information, and legal liability;
   B. If you are a Provider, a Vendor, or an Agent, to discipline, including revocation of your ability to access or use Confidential Information, and legal liability.
3.3 Relief. Any violation by you of any provision of this Agreement will cause irreparable injury to Intermountain that would not be adequately compensable in monetary damages alone or through other legal remedies, and will entitle Intermountain to the following:
   A. If you are a Workforce Member, or an Agent, to preliminary and permanent injunctive relief, a temporary restraining order, and other equitable relief in addition to damages and other legal remedies; or
   B. If you are a Provider, to a court order prohibiting your use of Confidential Information except as permitted by this Agreement, and Intermountain may also seek other remedies;

3.4 Authority. Intermountain may terminate your access to Confidential Information if your status as a Workforce Member, Provider, or Agent changes, if Intermountain determines that to be in the best interests of Intermountain’s mission, or if you violate any provision of this Agreement.

SECTION 4.0 Continuing Obligations. Your obligations under this Agreement continue after termination of your status as a Workforce Member, Provider, Vendor, or Agent.

Printed Name: ____________________________

Signature: ____________________________ Date: ____________

IHCPOD546 / 10-10
# Third Party Remote Access Form

## Company Information

<table>
<thead>
<tr>
<th>Company Name:</th>
<th>Contact Name:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Address:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>City, State, Zip:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Phone:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Fax:</th>
</tr>
</thead>
</table>

**NOTE:** The above stated company will notify Intermountain Healthcare and change any passwords or access codes into Intermountain’s computer systems upon the termination of the Contact Name or other employees associated with the remote access process.

List all individuals who will be accessing Intermountain Healthcare’s network (Name and DOB)

<table>
<thead>
<tr>
<th>Name</th>
<th>DOB</th>
</tr>
</thead>
</table>

**NOTE:** All individuals who will be accessing Intermountain’s network must sign the Trustee Confidentiality Agreement. Please attach all signed agreements for the individuals above to the request form.

### INTERMOUNTAIN Contact Information

<table>
<thead>
<tr>
<th>Facility:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Department:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Intermountain Healthcare Steward:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Phone:</th>
</tr>
</thead>
</table>

**NOTE:** Please fax this form when completed and signed, along with completed and signed 3rd Party Confidentiality documents to the following number:

**FAX:** 801-442-0463
**Intermountain Healthcare systems to be accessed (Host IP addresses, protocols and ports used, etc):**

---

**Time period for which access is requested:**

<table>
<thead>
<tr>
<th>Does Intermountain already have a signed Business Associate Agreement (BAA) in place with the 3rd party?</th>
<th>Does Intermountain already have a support agreement with the appropriate confidentiality agreements signed and submitted?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES / NO</td>
<td>YES / NO</td>
</tr>
</tbody>
</table>

(Please check this at the following URL: [http://thcweb/enterprise/compliance/hipaa/ba.php](http://thcweb/enterprise/compliance/hipaa/ba.php). If not, the Intermountain Steward will need to obtain one before access can be granted. For more information, please contact: privacy@intermountainmail.org, or the compliance hotline number at 1-800-442-4843)

**Additional Comments:**

---

To be completed by Intermountain Healthcare’s Corporate IS Security Team

**Security/Access Concerns:**

---

Access into Intermountain Healthcare’s computer systems is monitored and reviewed on a regular basis. Intermountain reserves the right to cancel access to all entities at any time if it feels there is a possible security breach or risk that requires immediate disconnection. Further, all access into Intermountain’s computer systems is bound to the current confidentiality and appropriate usage policies in effect.

*Your signatures below act as your acknowledgement and agreement to these policies.*

---

Vendor Contact Signature

Intermountain Healthcare Steward Signature

Request Approved by:

---

Intermountain Corporate IS Security

Date Approved

---

IHCPOD715/07-08
## DIVISION 1 - GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Section Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 1000</td>
<td>Summary of Work</td>
</tr>
<tr>
<td>01 1001</td>
<td>Responsibility Matrix</td>
</tr>
<tr>
<td>01 1900</td>
<td>Definitions and Standards</td>
</tr>
<tr>
<td>01 2300</td>
<td>Alternates</td>
</tr>
<tr>
<td>01 2600</td>
<td>Contract Modification Procedures</td>
</tr>
<tr>
<td>01 2900</td>
<td>Payment Procedures</td>
</tr>
<tr>
<td>01 3100</td>
<td>Project Management and Coordination</td>
</tr>
<tr>
<td>01 3313</td>
<td>Submittals</td>
</tr>
<tr>
<td>01 5050</td>
<td>Temporary Facilities and Controls</td>
</tr>
<tr>
<td>01 6000</td>
<td>Product Requirements</td>
</tr>
<tr>
<td>01 7300</td>
<td>Execution Requirements</td>
</tr>
<tr>
<td>01 7301</td>
<td>Construction Safety Requirements</td>
</tr>
<tr>
<td>01 7700</td>
<td>Closeout Procedures</td>
</tr>
<tr>
<td>01 7701</td>
<td>Record Drawing Requirements</td>
</tr>
<tr>
<td>01 7820</td>
<td>Operation and Maintenance Data</td>
</tr>
</tbody>
</table>
## RESPONSIBILITY MATRIX

Updated April 15, 2019

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 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
--- | --- | --- | ---
| OFOI - (Owner Furnished / Owner Installed) | (Coordinate location of items with Owner and track within construction schedule) | Data | Power | Backing |
| Art | Owner / Owner (Alpine Art) | All artwork to be coordinated with Dan Kohler. Provide power to required artwork. | Yes | Yes | Yes |
| Brochure Racks | Owner / Owner | Contractor to provide proper backing. | Yes | Yes | Yes |
| Chart Racks | Owner / Owner (Midwest) | Contractor to provide proper backing. | Yes | Yes | Yes |
| Copiers, fax | Owner / Owner | A/E to locate where copier/fax/printer is not visual clutter. | Yes | Yes | Yes |
| Cup Dispensers | Owner / Owner | | Yes | Yes | Yes |
| Exam Tables | Owner / Owner | | Yes | Yes | 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 | Yes |
| Reception Desk | Owner / Owner (Midwest & Steelcase) | | Yes | Yes | Yes |
| Moveable Metal Shelving | Owner / Owner | | Yes | Yes | Yes |
| Recliners / Draw Chairs | Owner / Owner | | Yes | Yes | Yes |
| Signage - Exterior | Owner / Owner (IG Group, YESCO) | Provide circuits for above ceiling signs. Provide coordinated traffic signage and contract to install. Intermountain Logo Signs - (2) 20A Circuits - May vary. InstaCare and other Signs - (1) 20A 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 to be installed. | Yes | Yes | Yes |
| 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 | Yes |
| Clinical Garbage Cans (Clinical, Office, PT, Etc.) | Owner / Owner | | Yes | Yes | Yes |
| 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 | | Yes | Yes | Yes |
| PACS | Owner / Owner | | Yes | Yes | Yes |
| Magnetic Marker Boards, Cork Boards, Huddle Boards, Idea Tracking Boards, etc. | Owner / Owner (Midwest) | A/E to coordinate location with Owner. | Yes | Yes | Yes |
| Emergency Evacuation Medical Sled (Med Sled) | Owner / Owner | A/E to coordinate location with Owner. | Yes | Yes | Yes |
| Supply Area Panels | Owner / Owner | Contractor to provide proper backing, coordinate with Owner. | Yes | Yes | Yes |
| Audio/Video (A/V) | 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 | Yes |
| Nurse Notification Call (NNC) System & Devices (Hospital Campus) | Owner / Owner (Hill-Rom) | Hospital local facility team to work with Supply Chain Facility Equipment Planning team to contract directly with Nurse Notification Call (NCC) system vendor (Hill-Rom) for devices, equipment, monitors, etc. A/E to identify NNC locations on drawings, coordinate with Owner. Contractor to provide all infrastructure including conduits, back boxes, and home-run cabling from NNC devices (e.g. RCB, GSR-10, etc.) to TEC/TDR rooms that connect to Intermountain's network (Intermountain Siemens certified installer low voltage subcontractor to install). The NNC system device to device cabling is by Hill-Rom. | Yes | Yes | Yes |
| Staff Assist Notification Call System & Devices (Hospital Campus on hospital campuses to match NNC system) | Owner / Owner (Hill-Rom) | 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 (Hill-Rom) 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 identify locations on drawings, coordinate with Owner. Contractor to provide all infrastructure including conduits, back boxes, and home-run cabling from Staff Assist Notification Call system devices (e.g. RCB, GSR-10, etc.) to TEC/TDR rooms that connect to Intermountain's network (Intermountain Siemens certified installer low voltage subcontractor to install). The Staff Assist Notification Call system device to device cabling is by Hill-Rom. | Yes | Yes | Yes |
| Staff Assist Notification Call System & Devices (Stand-alone Medical Group Clinics) | Owner / Owner (Hill-Rom) | IMG Ops team to work with Supply Chain Facility Equipment Planning team to contract directly with Staff Assist Notification Call system vendor (Hill-Rom) for devices, equipment, monitors, etc. (from wall side out). Staff Assist Notification system to be coordinated with Medical Group Strategic Planner and Operations Officer. A/E to identify locations on drawings, coordinate with Owner. Contractor to provide all infrastructure including conduits, back boxes, and home-run cabling from Staff Assist Notification Call system devices (e.g. RCB, GSR-10, etc.) to TEC/TDR rooms that connect to Intermountain's network (Intermountain Siemens certified installer low voltage subcontractor to install). The Staff Assist Notification Call system device to device cabling is by Hill-Rom. | Yes | Yes | Yes |
### 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. Yes

**Sharps Disposal Container**

**Owner / Owner (Stericycle)**

A/E to identify locations on drawings, coordinate with Owner. Backing to be coordinated, if required. Yes

**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

### OFC1 - (Owner Furnished / Contractor Installed)

#### (Coordinate location of items with Owner and track within construction schedule)

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Owner / Contractor</th>
<th>Data</th>
<th>Power</th>
<th>Backing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Automated External Defibrillator (AED)</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Time Clocks</strong></td>
<td>Owner / Contractor</td>
<td>Conduit and boxes by Contractor, Coordinate location with Owner.</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>PAPER Towel Dispensers</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Scrub Dispensers</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Toilet Paper Dispensers</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Sanitary Napkin Dispensers/Receptacles</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Diaper Changing Station</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Hand Sanitizer Dispensers (Avagard)</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Dental Oral Care Unit</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Diaper Dispensers</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Diaper Change Station</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Eye Wash Station</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Ergotron Brackets/Mounts, etc.</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Digital Projector Mounts, TV Mounts, &amp; Computer Mounts (Ergotron Brackets/Mounts, etc.)</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Stadiometers, Recessed Scales</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Procedure Lights</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Scrub Sinks &amp; Carriers</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>IV Track</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Boom Mounting Plates (Equipment, Lighting, Anesthesia)</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>OR Clocks</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Clinical Clocks</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Shower Curtains &amp; Rods</strong></td>
<td>Owner (Medline) / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Cubicure Curtains &amp; Tracks</strong></td>
<td>Owner (Medline) / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Digital Projector Mounts, TV Mounts, &amp; Computer Mounts (Ergotron Brackets/Mounts, etc.)</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Radiation Protection Calculations and Certification</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Patient Lifts</strong></td>
<td>Owner (Liko, subsidiary of Hill-Rom) / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Building Alarms / Medication Refrigerator Alarm / Pharmacy Alarm System</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>UPS (MRI, Data Room, CPU, or other similar equipment)</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Central Tracking Boards</strong></td>
<td>Owner / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Distributed Antenna System (DAS)</strong></td>
<td>Owner (Hunt Electric) / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
<tr>
<td><strong>Alerts - Mass Notification System (Public Areas)</strong></td>
<td>Owner (Alertius) / Contractor</td>
<td>A/E</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
</tbody>
</table>

### OFC2 - (Contractor Furnished / Contractor Installed)

#### Data Power Backing

- **Blinds/Shades (manual and powered)**
  - Contractor / Contractor
  - A/E to identify locations on drawings, coordinate with Owner.
  - Yes

- **Aerop Hoek/Reel (Heavy Duty in Radiology)**
  - Contractor / Contractor
  - A/E to identify locations on drawings, coordinate with Owner.
  - Yes

- **Communication Boar***
  - 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.
  - Yes Yes

- **Med Gas Certification**
  - Contractor / Contractor
  - Contractor to coordinate Vendor with Owner
<table>
<thead>
<tr>
<th>Category</th>
<th>Responsible Contractor</th>
<th>A/E Responsibilities</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Shower Station / Eye Wash Station</td>
<td>Contractor / Contractor</td>
<td>A/E to identify locations on drawings, coordinate with Owner.</td>
<td></td>
</tr>
<tr>
<td>Fire Extinguishers</td>
<td>Contractor / Contractor</td>
<td>A/E to identify types and locations on drawings, coordinate with Owner. 10 lbs.</td>
<td>minimum - refer to Intermountain Design Guidelines &amp; Construction Standards.</td>
</tr>
<tr>
<td>Grab Bars (Rest rooms, Radiology, Exam rooms, etc.)</td>
<td>Contractor / Contractor</td>
<td>A/E to identify locations on drawings.</td>
<td>Yes</td>
</tr>
<tr>
<td>Coat Hooks (Rest rooms/Showers, Exam rooms, Offices/Workstations only)</td>
<td>Contractor / Contractor</td>
<td>A/E to identify locations on drawings.</td>
<td></td>
</tr>
<tr>
<td>Mirrors (Rest rooms, Exams, Radiology, Rehab, etc.)</td>
<td>Contractor / Contractor</td>
<td>A/E to identify locations on drawings, coordinate with Owner.</td>
<td>Yes</td>
</tr>
<tr>
<td>Pneumatic Tube Systems</td>
<td>Contractor / Contractor (SwissLog, Atreo Group, or other approved)</td>
<td>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.</td>
<td>Yes, Yes</td>
</tr>
<tr>
<td>Plumbing Shrouds</td>
<td>Contractor / Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Cameras, Video Surveillance</td>
<td>Contractor / Contractor (AlphaCorp/Convergint)</td>
<td>A/E to identify locations on drawings, coordinate with Owner.</td>
<td>Yes</td>
</tr>
<tr>
<td>Voice/Data Cabling (all horizontal cabling)</td>
<td>Contractor / Contractor (Cache Valley Elec., IES Commercial, Data Tech Professionals, Hunt Electric, and others listed in Intermountain Div. 27)</td>
<td>A/E to coordinate with Owner/User on connections, pairs of fiber/copper, conduits, inner-ducts, etc.</td>
<td>Yes</td>
</tr>
<tr>
<td>Support Bracing/Structure for Radiology and similar equipment</td>
<td>Contractor / Contractor</td>
<td>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.</td>
<td>Yes, Yes, Yes</td>
</tr>
<tr>
<td>Wall Protection (Incl. Bumper and Corner Guards)</td>
<td>Contractor / Contractor</td>
<td>A/E to identify locations on drawings, coordinate with Owner.</td>
<td></td>
</tr>
<tr>
<td>Intrusion Detection</td>
<td>Contractor / Contractor</td>
<td>A/E to identify locations on drawings, coordinate with Owner.</td>
<td></td>
</tr>
<tr>
<td>Access Control, Card Readers (Lenel)</td>
<td>Contractor / Contractor (AlphaCorp/Convergint)</td>
<td>A/E to identify locations on drawings, coordinate with Owner.</td>
<td></td>
</tr>
<tr>
<td>Communication Cabling</td>
<td>Contractor / Contractor</td>
<td>A/E to identify locations on drawings, coordinate with Owner.</td>
<td></td>
</tr>
<tr>
<td>TV System Distribution</td>
<td>Contractor / Contractor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio/Video (A/V)</td>
<td>Contractor / Contractor</td>
<td>Intermountain SCO will source &amp; 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).</td>
<td>Yes, Yes</td>
</tr>
<tr>
<td>Nurse Notification Call (NNC) System - Low Voltage Cabling (Hospital Campus)</td>
<td>Contractor / Contractor (Hill-Rom)</td>
<td>A/E to identify NNC locations on drawings, coordinate with Owner.</td>
<td>Yes, Yes</td>
</tr>
<tr>
<td>Staff Assist Notification Call System - Low Voltage Cabling (Medical Group Clinics on hospital campuses to match nurse call system)</td>
<td>Contractor / Contractor (Hill-Rom)</td>
<td>A/E to identify locations on drawings, coordinate with Owner. Contractor to provide all infrastructure including conduits, back boxes, and home-run cabling from NNC devices (e.g. RCB, GSR-10, etc.) to TEC/TDR rooms that connect to Intermountain's network (Intermountain Siemon certified installer low voltage subcontractor to install). The NNC system device to device cabling is by Hill-Rom.</td>
<td>Yes, Yes</td>
</tr>
<tr>
<td>Staff Assist Notification Call System - Low Voltage Cabling (Stand-alone Medical Group Clinics)</td>
<td>Contractor / Contractor (Hill-Rom)</td>
<td>A/E to identify locations on drawings, coordinate with Owner. Contractor to provide all infrastructure including conduits, back boxes, and home-run cabling from Staff Assist Notification Call system devices (e.g. RCB, GSR-10, etc.) to TEC/TDR rooms that connect to Intermountain's network (Intermountain Siemon certified installer low voltage subcontractor to install). The Staff Assist Notification Call system device to device cabling is by Hill-Rom.</td>
<td>Yes, Yes</td>
</tr>
<tr>
<td>Patient Monitoring System &amp; Devices (Hospital Campus)</td>
<td>Contractor / Contractor</td>
<td>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.</td>
<td>Yes, Yes</td>
</tr>
<tr>
<td>Patient Monitoring System &amp; Devices (Stand-alone Medical Group Clinics)</td>
<td>Contractor / Contractor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION 01 1900
DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Definitions: Basic Contract definitions are included in the General Conditions.
1. Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Architect", "requested by the Architect", and similar phrases. However, no implied meaning shall be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.
2. Approve: The term "approved," where used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the duties and responsibilities of the Architect as stated in General and Supplementary Conditions. Such approval shall not release the Contractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.
3. Furnish: The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."
4. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
5. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
6. Protect: Except as otherwise defined in greater detail, the term "protect" is used to describe the process of shielding from harm existing fixtures, elements or materials.
7. Stabilize: To apply measures designed to reestablish a weather-resistant enclosure and the structural reinforcement of an item or portion of the building while maintaining the essential form as it exists at present.
8. Protect and Maintain: To remove deteriorating corrosion, reaply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.
9. Remove: To detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
10. Remove and Salvage: To detach items from existing construction and deliver them to Owner ready for reuse.
11. Remove and Reinstall: To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.
12. Existing to Remain or Retain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled.
13. 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.
B. **Specification Format and Conventions:**

1. **Specification Format:** The Specifications are organized into Divisions and Sections using the 49-division format and CSI/CSC’s “MasterFormat” numbering system.
   a. **Section Identification:** The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

2. **Specification Content:** The Specifications use certain conventions for style of language and the intended meaning of terms, words, and phrases when used in particular situations. These conventions are as follows.
   a. **Abbreviated Language:** Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
   b. **Mood** and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
      1) The words “shall”, “shall be”, or “shall comply with”, depending on the context, are implied where a colon (:) is used within a sentence or phrase.

C. **Drawing Symbols:**

1. **Graphic Symbols:** Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., latest edition.
   a. **Mechanical/Electrical Drawings:** Graphic symbols used on mechanical and electrical Drawings are generally aligned with symbols recommended by ASHRAE. Where appropriate, they are supplemented by more specific symbols recommended by technical associations including ASME, ASPE, IEEE, and similar organizations. Refer instances of uncertainty to the Architect for clarification before proceeding.

D. **Industry Standards:**

1. **Applicability of Standards:** Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference. Individual Sections indicate which codes and standards the Contractor must keep available at the Project Site for reference.
2. **Publication Dates:** Where the date of issue of a referenced standard is not specified, comply with the standard in effect as of date of Contract Documents.
3. **Conflicting Requirements:** Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect for a decision before proceeding.
4. **Copies of Standards**: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity’s construction activity. Copies of applicable standards are not bound with the Contract Documents.
   a. **Where copies of standards are needed** for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.
   b. **Although copies of standards needed** for enforcement of requirements also may be included as part of required submittals, the Architect reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

E. **Abbreviations and Names**: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision.

**END OF SECTION**
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 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.

B. 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: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

B. 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.

C. 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 modifications to alternates.

D. Execution of Work: Execute accepted alternates under the same conditions as other work of the Contract.

E. 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. ALTERNATE NO. 1 – MEDICAL GASES ADDITION

Provide a cost estimate to add the following medical gases to the ceiling mounted boom from the nearest risers available: (1) Carbon Dioxide (CO2), (1) Nitrous Oxide (N2O) and (1) Waste Anesthesia Gas Disposal (WAGD).

END OF SECTION
SECTION 01 2600

CONTRACT MODIFICATION 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 specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:
   1. Section 01 6000 "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on forms issued by the Architect or the Owner.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

   1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

   2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

      b. Indicate delivery charges, equipment rental, and amounts of trade discounts.

      c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
B. **Contractor-Initiated Proposals**: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to the Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. **Proposal Request Form**: Use forms issued by the Architect or the Owner.

1.5 **CHANGE ORDER PROCEDURES**

A. **On Owner's approval of a Proposal Request**, Contractor shall generate Change Orders on a monthly basis.

1.6 **CONSTRUCTION CHANGE DIRECTIVE**


1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. **Documentation**: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

**PART 2 – PRODUCTS - NOT USED**

**PART 3 – EXECUTION - NOT USED**

**END OF SECTION**
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 specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:
   1. Section 01 2600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
   2. Application for Payment forms with Continuation Sheets.
   4. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
   5. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
   1. Identification: Include the following Project identification on the Schedule of Values:
      a. Project name and location.
      b. Name of Architect.
      c. Architect's project number.
      d. Contractor's name and address.
      e. Date of submittal.
2. Arrange the Schedule of Values in tabular form with separate columns to indicate
the following for each item listed:
a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value.
   1) Percentage of the Contract Sum to nearest one-hundredth
   2) Contract Sum.
   3) Total equal to total 100 percent.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued
evaluation of Applications for Payment and progress reports. Coordinate with
the Project Manual table of contents. Provide several line items for principal
subcontract amounts, where appropriate.
a. Include line items for Commissioning under principal subcontract
   amounts, where appropriate.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work
where Applications for Payment may include materials or equipment purchased
or fabricated and stored, but not yet installed.
a. Differentiate between items stored on-site and items stored off-site.
   Include evidence of insurance or bonded warehousing if required.
6. Provide separate line items in the Schedule of Values for initial cost of materials,
for each subsequent stage of completion, and for total installed value of that part
of the Work.
7. Each item in the Schedule of Values and Applications for Payment shall be
complete. Include total cost and proportionate share of general overhead and
profit for each item.
a. Temporary facilities and other major cost items that are not direct cost of
   actual work-in-place may be shown either as separate line items in the
   Schedule of Values or distributed as general overhead expense, at
   Contractor's option.
8. Schedule Updating: Update and resubmit the Schedule of Values before the
next Applications for Payment when Change Orders or Construction Change
Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. General: Each Application for Payment shall be consistent with previous applications
and payments as certified by Architect and paid for by Owner.
1. Initial Application for Payment, Application for Payment at time of Substantial
   Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the
Agreement between Owner and Contractor. The period of construction Work covered by
each Application for Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703
Continuation Sheets as form for Applications for Payment.
D. **Application Preparation:** Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
   1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
   2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. **Transmittal:** Submit one signed and notarized original copy of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. **Application for Payment at Substantial Completion:** After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete, including commissioning and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

**PART 2 – PRODUCTS - NOT USED**

**PART 3 – EXECUTION - NOT USED**

**END OF SECTION**
SECTION 01 3100
PROJECT MANAGEMENT AND COORDINATION

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 provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General project coordination procedures.
   2. Conservation.
   3. Coordination Drawings.
   4. File Transfer.
   5. Administrative and supervisory personnel.
   6. Project meetings.

B. **Contractor must participate** in coordination requirements.

C. **Related Sections:** The following Sections contain requirements that relate to this Section:
   1. Section 01 7300 "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   2. Section 01 7700 "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

A. **Coordination:** Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. **Memoranda:** If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
C. **Administrative Procedures**: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor’s Construction Schedule.
   2. Preparation of the Schedule of Values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Preinstallation conferences.
   7. Project closeout activities.

D. **Administrative Requirements**: Contractor shall submit all project related information (i.e. submittals, RFI’s, ASI’s, addenda, construction documents, project logs, field reports, and meeting minutes) using the Owner’s Submittal Exchange. Architect will provide access information to the Contractor at the pre-construction meeting or as appropriate to the schedule of the project.
   1. Contractor shall employ a PDF review software system such as Blue Beam (www.bluebeam.com) or another similar system for producing, formatting, and marking-up project related documents. Contractor shall review all the documents and add their stamp and comments directly to the PDF prior to posting for the Architect to review.
   2. Contractor shall provide to the Architect and Owner an electronic archive of all data at the end of the project via DVD(s) for final project records.

E. **Contractor is to keep a printed record** of all Construction Documents including all clarifications, RFI’s and approved changes to the Contract on site.

F. **Conservation**: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

1.4 **SUBMITTALS**

A. **Staff Names**: Within 5 business days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
   1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

B. **Submittal Log**: See section ‘Submittals’ for electronic delivery and record keeping.

C. **Coordination Drawings**: Provide complete coordination drawings as specified in “Coordination Meetings and Submittals”.
1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

B. Perform project quality control in accordance with requirements specified in Related Sections, including:
   1. Division 1 Section "Quality Control Services".
   2. Division 1 Section "Construction Waste Management and Disposal".

1.6 CONSTRUCTION PROGRESS DOCUMENTATION

A. Progress Photographs:
   1. Photographically document site conditions prior to start of construction operations.
   2. Take weekly photographs throughout the entire project. Photographs shall be provided for unrestricted use by Owner.
      a. Indicate photographs demonstrating environmental procedures.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
   1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
   2. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Tentative construction schedule.
      b. Phasing.
      c. Critical work sequencing.
      d. Designation of responsible personnel.
      e. Procedures for processing field decisions and Change Orders.
      f. Procedures for processing Applications for Payment.
      g. Distribution of the Contract Documents.
      h. Submittal procedures.
      i. Preparation of Record Documents.
3. **Documentation:** Furnish Architect certificate of insurance naming VCBO as an additional insured.

C. **Progress Meetings:** Conduct progress meetings at intervals as agreed by Owner, Contractor and Design Professionals. Coordinate dates of meetings with preparation of payment requests.
   1. **Reporting:** Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
      a. **Schedule Updating:** Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.8 **REQUESTS FOR INFORMATION (RFI)**

A. **Procedure:** Immediately on discovery of the need for interpretation of Contract Document, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
   1. RFIs shall be submitted by the Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
   3. Contractor is to keep a printed record of all RFI's and post them on the 'Record Drawings' kept on site.

B. **Content of the RFI:** Include a detailed, legible description of item needing interpretation and the following:
   1. Project name.
   2. Date.
   3. Name of Contractor.
   4. Name of Architect and Owner.
   5. RFI number, numbered sequentially.
   6. Specification Section number and title and related paragraphs, as appropriate.
   7. Drawing number and detail references, as appropriate.
   8. Field dimensions and conditions, as appropriate.
   9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contractor Time or the Contract Sum, Contractor shall state impact in the RFI.
   10. Contractor's signature.
   11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
      a. Supplementary drawings prepared by Contractor shall include dimensions, thickness, structural grid references, and details of affected materials, assemblies, and attachments.
C. **Electronic RFI's:**
   1. RFI's shall be processed and delivered electronically through web-based RFI processing software (via Owner's Submittal Exchange).
   2. Identify each page of attachments with the General Contractors RFI number and sequential page number.
   3. Attachments shall be electronic files in PDF format.

D. **Architect's Action:** Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFI's received after 1:00 p.m. will be considered as received the following working day.
   1. The following RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Request for approval of substitutions.
      c. Requests for coordination information already indicated in the Contract Documents.
      d. Request for adjustments in the Contract Time or Contract Sum.
      e. Requests for interpretation of Architect's actions on submittals.
      f. Incomplete RFIs or RFI with numerous errors.
   2. Architect's action may include a request for additional information, in which case Architect's Time for response will start again.
   3. Architect's action on RFI that may result a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
      a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Owner in writing within 10 calendar days of receipt of the RFI response.

E. **On receipt of Architect's Owner's action,** update the RFI log and immediately distribute the RFI response to the affected parties. Review response and notify Architect and Owner within seven calendar days if Contractor disagrees with response.

F. **RFI Log:** Prepare, maintain, and submit a tabular log of RFIs organized by RFI number. Submit log monthly.
   1. Project name.
   2. Name and address of Contractor.
   3. Name and address of Architect and Owner.
   4. RFI number including RFIs that were dropped and not submitted.
   5. RFI description.
   6. Date the RFI was submitted.
   7. Date Architect's and Owner's response was received.
   8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION
SECTION 01 3313
SUBMITTALS

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 specifies administrative and procedural requirements for submittals required for performance of the Work, including:
   1. Contractor’s construction schedule.
   2. Daily construction reports.
   3. Shop Drawings.
   4. Product Data.
   5. Samples.

B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
   1. Applications for payment.
   2. Performance and payment bonds.
   3. Insurance certificates.
   4. List of Subcontractors.

C. Related Sections:
   1. Section 01 3100 "Project Management and Coordination" for electronic web-based construction administration software (using Owner's Submittal Exchange).
   2. Section 01 4000 "Quality Control Services" for inspection and test reports.

1.3 ELECTRONIC SUBMITTAL DELIVERY

A. To minimize printing reimbursables, shipping reimbursables and the impact on the environment, process and deliver submittals electronically through Submittal Exchange.
   1. One complete hard copy of each submittal shall also be furnished for verification of the completeness of electronic submission, if requested by Architect.

B. Construction Manager or General Contractor must first review and approve submittals sent by Subcontractors prior to sending to Architect. Include Contractor’s certification that information complies with Contract Document requirements; record deviations from Contract Document requirements, including minor variations and limitations.
   1. Contractor shall coordinate numbering system and nomenclature with Architect prior to first submissions.
   2. Email notifications of items delivered to Submittal Exchange shall be sent to both the project manager and the appropriate administrative assistant in the Architect's office simultaneously with posting to Submittal Exchange.
C. **Submittals must follow the requirements outlined** in this specification and as required in individual specification sections.

D. **Deliver the following** to the Architect electronically in pdf format:
   1. Product Data
   2. Shop Drawings
   3. Certifications
   4. Test Data
   5. Schedules
   6. Calculations
   7. Mix Designs
   8. Warranty Information

E. **Samples and Color Selection**
   1. Log physical samples via Submittal Exchange, but deliver by mail or courier to the Architect for review.
   2. Samples and color selection will not be reviewed electronically.
   3. See separate specification sections for quantities and sample selection process. The Architect shall return review comments via the Architect's File Transfer Site.

F. **Submittal Stamps**
   1. Contractor or Construction Manager shall affix an electronic stamp to PDF submittals.

G. **Submittal Logs**
   1. Architect shall maintain a submittal log through Submittal Exchange, however, General Contractor or Construction Manager shall be responsible for maintaining the official submittal log.

### 1.4 SUBMITTAL PROCEDURES

A. **No submittal will be accepted** by the Architect without the General Contractor's action stamp, clearly visible, indicating that the submittal has been fully reviewed by the General Contractor for compliance to the Construction Documents.

B. **Submittals with the General Contractor's stamp but not in compliance** with the Construction Documents will be deemed incomplete and returned without review. These will not be shown as received.

C. **Coordination**: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
      a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
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.

1. **Initial Review:** Allow 14 calendar days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. **Concurrent Review:** Where concurrent review of submittals by Architect’s consultants, Owner, or other parties is required, allow 21 calendar days for initial review of each submittal.
3. **Deferred Submittal Review:** Where deferred submittals are required by the Building Code Official allow review time as dictated by the Official.
4. If intermediate submittal is necessary, process it in same manner as initial submittal.
5. Allow 14 calendar days for processing each resubmittal.
6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

E. **Submittal Preparation:** Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Include the following information on the 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.

F. **Submittal Transmittal:** Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.

1. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor’s certification that information complies with Contract Document requirements.

G. **Submittal requirements** for electronic PDF submittals:

1. Create submittals with native PDF files whenever possible. Do not print a PDF file, and scan in as an image file, as this will delete all file search functions typically embedded within a native PDF file.
2. Break down PDF submittals by individual specification section. Do not collate multiple specification sections together into one non-separated submittal package (i.e. carpet, VCT, rubber base, and entry mats; though frequently provided by one installer, shall not be submitted as one non-separated package unless formatted as described below.)
3. All PDF submittals that cover multiple items within one specification section, or PDF submittals that include multiple related specification sections shall have an index and be formatted with electronic book marks to distinguish various components from one another, and make each item easily retrievable without navigating through each page of an entire submittal.
1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. **Bar-Chart Schedule:** Prepare a fully developed, horizontal bar-chart type Contractor's construction schedule.
   1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
   2. Within each time bar indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
   3. Prepare the schedule on a sheet of sufficient width to show data for the entire construction period.
   4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
   5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.
   6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.

B. **Distribution:** Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
   1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

C. **Schedule Updating:** Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 DAILY CONSTRUCTION REPORTS

A. **Daily Construction Report:** Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Architect at weekly intervals:
   1. List of subcontractors at the site.
   2. Approximate count of personnel at the site.
   3. High and low temperatures, general weather conditions.
   4. Accidents and unusual events.
   5. Meetings and significant decisions.
   7. Meter readings and similar recordings.
   8. Orders and requests of governing authorities.
   9. Change Orders received, implemented.
   10. Services connected, disconnected.
B. **Material Location Reports**: At monthly intervals, prepare a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. **Field Condition Reports**: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a request for information on CSI Form 13.2A. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

### 1.7 SPECIAL REPORTS

A. **General**: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. **Reporting Unusual Events**: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor’s personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

### 1.8 SHOP DRAWINGS

A. **Submit newly prepared information**. drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings.

B. **Shop Drawings include** fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
   1. Dimensions.
   2. Identification of products and materials included.
   3. Compliance with specified standards.
   4. Notation of coordination requirements.
   5. Notation of dimensions established by field measurement.

C. **Sheet Size**: Submit Shop Drawings, layout drawings and other Revit or CADD style sheets formatted for 24 x 36 inch or 30 x 42 inch sheets. Details and drawings are to match or exceed construction bid document scales. All drawings are to be submitted to scale. All other product brochures and cut sheets can be provided in an 8-1/2 x 11 format.

D. **Final Electronic Submittal**: Submit 2 prints, one for the Architect and one for the Owner at the end of the project or as requested by the parties during construction.
   1. If submittal was reviewed by members of the design team other than the Architect, provide an additional copy of the submittal for each design firm.
   2. The prints shall be marked-up and maintained as a "Record Document".
1.9 DELEGATED DESIGN/DEFERRED SUBMITTALS

A. **Performance and Design Criteria:** Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. **Delegated-Design Services Certification:** In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

C. **Refer to the General Information sheet** on the Drawings for a list of required delegated design/deferred submittals.

D. **Submit deferred submittals** on same size sheet as original drawings (30 x 42 or 8 1/2 x 11). Drawings and calculations shall be on the Design Professional’s title block stating the project name and all other items specified under ‘Submittal Preparation’ above.

E. **Furnish deferred submittals to the Architect** who will electronically submit to the Building Code Official for review as required by the IBC.

F. Contractor shall include these submittal sheets in the Record Documents.

1.10 PRODUCT DATA

A. **Submit in timely manner** to complete project, but **no later than 90 days** after Notice of Award.

B. **Collect Product Data into a single submittal** for each element of construction or system. Product Data includes printed information such as manufacturer’s installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as “Shop Drawings.”
   1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
      a. Manufacturer’s printed recommendations.
      b. Compliance with recognized trade association standards.
      c. Compliance with recognized testing agency standards.
      d. Application of testing agency labels and seals.
      e. Notation of dimensions verified by field measurement.

C. **Do not submit Product Data until** compliance with requirements of the Contract Documents has been confirmed.
D. **Submittals:** Submit 4 copies of each required submittal; submit 6 copies where required for maintenance manuals. The Architect will retain one, and will return the other marked with action taken and corrections or modifications required.

E. **Electronic Submittals:** Submit a pdf copy of each required submittal; include copies where required for maintenance manuals. See electronic submittal delivery and submittal procedures for further requirements.

### 1.11 SAMPLES

A. **Submit in timely manner** to complete project, but **no later than 90 days** after Notice of Award.

B. **Samples:** Submit full-size, fully fabricated samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

C. **Submittals:** Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.
   
   1. Maintain sets of samples and a file of product submittals, as returned, at the Project site, for quality comparisons and product verification throughout the course of construction.

### 1.12 CONTRACTOR’S REVIEW

A. **Contractor’s Review:** Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

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

C. **Submittals not marked** with an approval stamp and those not in compliance with the Construction Documents shall be returned without further review. It is the Contractor's responsibility to review submittals for compliance prior to forwarding the submittal to the Design Team for review.

### 1.13 ARCHITECT’S ACTION

A. **Architect’s Action:** Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.

   1. Compliance with specified characteristics is the Contractor’s responsibility.
B. **Action Stamp:** The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked to indicate the action taken.

1. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The Contractor is responsible for; confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies administrative and procedural requirements for temporary services and facilities, including such items as temporary utility services, temporary construction and support facilities, and project security and protection.

B. Temporary construction and support facilities required for the project include but are not limited to the following:
   1. Sanitary facilities, including drinking water.
   2. Hoists.
   3. First aid station.
   4. Waste disposal services.
   5. Construction aids and miscellaneous general services and facilities.

C. Security and protection facilities and services required for the project include but are not limited to the following:
   1. Temporary fire protection.
   2. Barricades, warning signs, lights.
   3. Enclosure fence for stored material.
   4. Environmental protection.

1.2 QUALITY ASSURANCE

A. Regulations: Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities, including but not limited to the following:
   1. Building codes, including requirements for permits, testing and inspection.
   2. Health and safety regulations.
   3. Utility company regulations and recommendations governing temporary utility services.
   4. Environmental protection regulations governing use of water and energy, and the control of dust, noise and other nuisances.


C. Refer to the most current "Guidelines for Bid Conditions for Temporary Job Utilities and Services", as prepared jointly be AGC and ASC industry recommendations.

1.3 JOB CONDITIONS

A. General: Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in the performance of the work. Maintain, expand as required and modify temporary services and facilities as needed throughout the progress of the Work. Do not remove until services or facilities are no longer needed, or are replaced by the authorized use of completed permanent facilities.
B. **Conditions of Use**: Operate temporary services and facilities in a safe and efficient manner. Do not overload temporary services or facilities, and do not permit them to interfere with the progress of the work. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.
1. **Temporary Construction and Support Facilities**: Maintain temporary facilities in such a manner as to prevent discomfort to users. Take necessary fire prevention measures. Maintain temporary support facilities in a sanitary manner so as to avoid health problems and other deleterious effects.
2. **Security and Protection**: Maintain site security and protection facilities in a safe, lawful and publicly acceptable manner. Take necessary measures to prevent erosion of the site.

**PART 2 - PRODUCTS**

**2.1 MATERIALS AND EQUIPMENT**

A. **General**: Provide new materials and equipment for temporary services and facilities, used materials and equipment that are undamaged and in serviceable condition may be used, if acceptable to the Architect.

B. **Temporary Construction and Support Facilities**: Provide facilities that can be maintained properly throughout their use at the project site.

C. **Temporary Offices and Similar Construction**: For temporary offices, fabrication shops, storage sheds and similar construction, provide either standard prefabricated or mobile units or the equivalent job-built construction.

1. **Self-contained Toilet Units**: Provide single-occupant self-contained toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar non-absorbent material.
2. **Tarpaulins**: Provide waterproof, fire-resistant, UL labeled tarpaulins with a flame-spread rating of 15 or less.
3. **First Aid Supplies**: Comply with governing regulations and recognized recommendations within the construction industry.
4. **Drinking Water**: Provide potable water approved by local health authorities.
5. **Sign Materials**: For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thicknesses indicated. Provide exterior grade acrylic-latex-base enamel for painting panels and applying graphics.

D. **Fire Extinguishers**: Provide type "A" fire extinguishers for temporary offices and similar spaces where there is a minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.

**PART 3 - EXECUTION**

**3.1 INSTALLATION, GENERAL**

A. **General**: Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.

1. Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.
3.2 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. General: Provide a reasonably neat and uniform appearance in temporary construction and support facilities acceptable to the Architect/Engineer and the Owner.

1. Locate field offices, storage and fabrication sheds and other support facilities for easy access to the Work. Position offices so that windows give the best possible view of construction activities.

2. Maintain field offices, storage and fabrication sheds, temporary sanitary facilities, waste collection and disposal systems, and project identification and temporary signs until near substantial completion. Immediately prior to substantial completion remove these facilities.

B. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities; provide not less than specified requirements. Install in locations that will best serve the project's needs.

1. Sanitary facilities located within the existing facility will not be permitted to be used by the Contractor.

C. Hoists: Provide adequate facilities for hoisting materials and employees. Do not permit employees to ride hoists which comply only with requirements for hoisting materials. The Contractor is responsible for selection of type, size, and number of facilities. Truck cranes and similar devices used for hoisting are considered as being "tools and equipment" and not temporary facilities.

D. Collection and Disposal of Wastes:

1. Establish a system for daily collection and disposal of waste or extraneous materials from all construction areas on site that may present a hazard to the project, its craftsmen and the expeditious construction of the work. The Contractor shall provide to the Owner a satisfactory method to assure clean-up is performed in a timely and expeditious fashion. Enforce requirements strictly. Do not hold collected materials at the site longer than 1 day. Handle waste materials that are hazardous, dangerous, or unsanitary separately from other inert waste by containerizing appropriately. Dispose of waste material in a lawful manner.

   a. Burying or burning of waste materials on the site will not be permitted.
   b. Washing waste materials down sewers or into waterways will not be permitted.
   c. Provide rodent proof containers located on each floor level of construction work, to encourage depositing of lunch garbage and similar wastes by construction personnel.

2. The Owner reserves the right to withhold payments and perform the clean-up, if necessary, at the expense of the Contractor, if unsatisfactory clean-up efforts are not performed in a timely fashion.

E. Construction Aids and Miscellaneous Services and Facilities:

1. Design, construct, and maintain construction aids and miscellaneous general services and facilities as needed to accommodate performance of the work. Construction aids and miscellaneous general services and facilities include, but are not limited to the following:

   a. Temporary stairs and ladders.
   b. Guardrails and barriers.

2. Stairs: Provide temporary stairs where ladders are not adequate for performance of work.

3. Guardrails and Barriers: Provide guardrails at all unprotected edges of floor and roof openings, and at perimeter of roof and unenclosed floors.
3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. **General:** Provide a reasonably neat and uniform appearance to security and protection facilities acceptable to the Architect/Engineer and the Owner.

B. **Temporary Fire Protection:**
   1. Install and maintain temporary fire protection facilities of the types needed to adequately protect against reasonably predictable and controllable fire losses. Comply with applicable recommendations of the NFPA Standard 10 "Standard for Portable Fire Extinguishers". Locate fire extinguishers where they are most convenient and effective for their intended purpose. Store combustible materials in containers in recognized fire-safe locations.
   2. Develop and supervise an overall fire prevention and first-aid fire protection program for personnel at the project site. Review needs with the local fire department officials and establish procedures to be followed. Instruct personnel in methods and procedures to be followed. Post warnings and information and enforce strict discipline. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking of any kind on school property. Provide supervision of welding operations, and similar sources of ignition for possible fires.

C. **Security Enclosure and Lockups:**
   1. Install general temporary enclosure of partially completed areas of construction. Provide locking entrances adequate to deter unauthorized entrance, vandalism, theft and similar deleterious effects of violations of project security.
   2. Storage: Where materials and equipment must be temporarily stored, prior to and during construction, and are of substantial value or are attractive for possible theft, provide a secure lockup and enforce strict discipline in connection with the timing of installation and release of materials, so that the opportunity for theft and vandalism is minimized.

D. **General Environmental Protection:** Provide general protection facilities, operate temporary facilities, conduct construction activities, and enforce strict discipline for personnel on the site in ways and by methods that comply with environmental regulations, and that minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result from the performance of work at the site. Avoid the use of tools and equipment which produce harmful noise. Restrict the use of noise making tools and equipment to hours of use that will minimize noise complaints from persons and firms near the project site.
3.4 OPERATING, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary services and facilities at the site. Limit availability of temporary services and facilities to essential and intended uses to minimize waste and abuse. Do not permit temporary installations to be abused or endangered. Do not allow hazardous, dangerous or unsanitary conditions to develop or persist on the project site.

B. Maintenance: Operate and maintain temporary services and facilities in good operating condition throughout the time of use and until removal is authorized. Protect from damage by freezing temperatures and similar elements.

C. Termination and Removal: Unless the Architect requests that it be maintained for a longer period of time, remove each temporary service and facility promptly when the need for it or a substantial portion of it has ended, or when is has been replaced by the authorized use of a permanent facility, or no later than substantial completion. Complete, or, if necessary, restore permanent work which may have been delayed because of interference with the temporary service or facility. Repair damaged work, clean exposed surfaces and replace work which cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary services and facilities and remain the property of the Contractor.

END OF SECTION
SECTION 01 6000
PRODUCT REQUIREMENTS

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 administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers’ standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:
   1. Section 01 1900 "Definitions and Standards" for applicable industry standards for products specified.
   3. Section 01 7700 "Closeout Procedures" for submitting warranties for contract closeout.
   4. Divisions 2 through 48 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products. Only new products are allowed to be used unless directed by the Architect in writing.
   3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.
D. **Manufacturer's Warranty**: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. **Special Warranty**: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

### 1.4 SUBMITTALS

A. **Product List**: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer’s name and proprietary product names for each product.
   1. **Coordination**: Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
   2. **Form**: Tabulate information for each product under the following column headings:
      a. Specification Section number and title.
      b. Generic name used in the Contract Documents.
      c. Proprietary name, model number, and similar designations.
      d. Manufacturer's name and address.
      e. Supplier's name and address.
      f. Installer's name and address.
      g. Projected delivery date or time span of delivery period.
      h. Identification of items that require early submittal approval for scheduled delivery date.
   3. **Initial Submittal**: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
      a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
   4. **Completed List**: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
   5. **Architect's Action**: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. **Substitution Requests**: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. **Substitution Request Form**: Use CSI Form 13.1A.
   2. **Documentation**: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified material or product cannot be provided.
      b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
i. Detailed comparison of Contractor’s Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer’s letterhead, stating lack of availability or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor’s certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
l. Contractor’s waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect’s Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 business days of receipt of request, or 7 business days of receipt of additional information or documentation, whichever is later.
a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section “Submittal Procedures.” Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. **Deliver, store, and handle products** using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer’s written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer’s original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer’s written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

1.7 PRODUCT WARRANTIES

A. **General**: Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer’s disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. **Special Warranties**: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer’s Standard Form: Modified to include Project-specific information and properly executed.
2. Refer to Divisions 2 through 48 Sections for specific content requirements and particular requirements for submitting special warranties.

C. **Submittal Time**: Comply with requirements in Division 1 Section “Closeout Procedures.”

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. **General Product Requirements**: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.


7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
   a. Substitutions may be considered, unless otherwise indicated.

2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
   a. Substitutions may be considered, unless otherwise indicated.

3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
   a. Substitutions may be considered, unless otherwise indicated.

4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
   a. Substitutions may be considered, unless otherwise indicated.

5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

7. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.

8. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Products" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
   a. Substitutions may be considered, unless otherwise indicated.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.
   a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
   a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
   b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   2. Requested substitution does not require extensive revisions to the Contract Documents.
   3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   4. Substitution request is fully documented and properly submitted.
   5. Requested substitution will not adversely affect Contractor's Construction Schedule.
   6. Requested substitution has received necessary approvals of authorities having jurisdiction.
   7. Requested substitution is compatible with other portions of the Work.
   8. Requested substitution has been coordinated with other portions of the Work.
   9. Requested substitution provides specified warranty.
  10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.

PART 3 - EXECUTION - NOT USED

END OF SECTION
SECTION 01 7300
EXECUTION REQUIREMENTS

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 general procedural requirements governing execution of the Work including, but not limited to, the following:
   2. General installation of products.
   4. Progress cleaning.
   5. Starting and adjusting.
   6. Protection of installed construction.
   7. Correction of the Work.

B. Related Sections include the following:
   1. Section 01 3100 “Project Management and Coordination” for procedures for coordinating field engineering with other construction activities.
   2. Section 01 3300 “Submittals” for administrative submittals and also product and procedural submittals.
   3. Section 01 7700 “Closeout Procedures” for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
   1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
C. **Acceptance of Conditions**: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

   1. **Written Report**: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
      a. Description of the Work.
      b. List of detrimental conditions, including substrates.
      c. List of unacceptable installation tolerances.
      d. Recommended corrections.

   2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

   3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

   4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

   5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

A. **Existing Utility Interruptions**: Do not interrupt utilities serving facilities occupied unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

   1. Notify Architect and Owner not less than two business days in advance of proposed utility interruptions.

   2. Do not proceed with utility interruptions without Architect’s and Owner’s written permission.

B. **Field Measurements**: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. **Space Requirements**: Verify space requirements and dimensions of items shown diagrammatically on Drawings.


### 3.3 CONSTRUCTION LAYOUT

A. **Verification**: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to existing building. If discrepancies are discovered, notify Architect promptly.
B. General:
1. **Establish benchmarks** and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. **Establish dimensions** within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. **Inform installers** of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. **Notify Architect** when deviations from required lines and levels exceed allowable tolerances.

C. **Building Lines and Levels**: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. **Record Log**: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.5 INSTALLATION

A. **General**: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance as indicated in spaces without a suspended ceiling.

B. **Comply with manufacturer's written instructions** and recommendations for installing products in applications indicated.

C. **Install products** at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. **Conduct construction operations** so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. **Tools and Equipment**: Do not use tools or equipment that produce harmful noise levels.

F. **Anchors and Fasteners**: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
1. **Mounting Heights**: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
G. **Joints**: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

H. **Hazardous Materials**: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 PROGRESS CLEANING

A. **General**: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
   2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 degrees F.
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. **Site**: Maintain Project site free of waste materials and debris.

C. **Work Areas**: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. **Installed Work**: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. **Concealed Spaces**: Remove debris from concealed spaces before enclosing the space.

F. **Exposed Surfaces**: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. **Cutting and Patching**: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
   1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

H. **Waste Disposal**: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

I. **Protection**: During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
J. **Maintenance:** Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure smooth operation without damaging effects.

K. **Limiting Exposures:** Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.7 DUST CONTROL

A. **Provide continuous** (7 days per week, 24 hours per day) **fugitive dust control measures** within the limits of the construction site, related sites and adjacent streets and roads. Dust control shall be provided for, but not be specifically limited to, the stabilization of unpaved roads, haul roads, access roads, spoil sites, borrow and material sources, excavations, embankments, stockpiles, and all other areas which become potential sources of dust as a result of construction activities.

B. **Maintain compliance with the General Utah Air Pollution Regulations,** R446 - Utah Air Conservation Regulations, Section 4.5, Fugitive Emissions, applicable County Air Pollution Control Ordinances, and as directed by the Architect. Dust control measures shall include but not be limited to the following:
   1. Wetting of surfaces with water as appropriate.
   2. Minimizing surface disturbances.

C. **In order to control fugitive dust emissions,** apply the following procedures and techniques:
   1. Cover loads of materials, debris and waste materials taken from construction sites as needed to suppress dust during transit.
   2. Water down or apply other approved dust control measures to the construction site, haul roads and public access roads as needed to suppress dust.
   3. All mud and dirt shall be removed from vehicles prior to entering a paved or graveled area or road. Any mud or dirt that is carried out onto paved or graveled surfaces shall be removed from surfaces immediately and no less than daily.

### 3.8 STARTING AND ADJUSTING

A. **Start equipment** and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. **Adjust operating components** for proper operation without binding. Adjust equipment for proper operation.

C. **Test each piece** of equipment to verify proper operation. Test and adjust controls and safety. Replace damaged and malfunctioning controls and equipment.

D. **Manufacturer's Field Service:** If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

### 3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. **Provide final protection** and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
B. **Comply with manufacturer’s written instructions** for temperature and relative humidity.

### 3.10 CORRECTION OF THE WORK

A. **Repair or remove** and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 2 Section “Cutting and Patching.”
   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. **Restore permanent facilities** used during construction to their specified condition.

C. **Remove and replace damaged surfaces** that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. **Repair components** that do not operate properly. Remove and replace operating components that cannot be repaired.

E. **Remove and replace** chipped, scratched, and broken glass or reflective surfaces.

**END OF SECTION**
CONSTRUCTION SAFETY REQUIREMENTS

I. Outside Contractors and Intermountain Construction Employees performing construction activities on Intermountain Healthcare property shall meet the following 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.
ii. The Facility Engineering Director will be responsible to assure that the contractor is in compliance with Intermountain's Confined Space Policy.

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.
   ii. The action level for fall protection on Intermountain Healthcare property is 6’. This includes work from scaffold.
SECTION 01 7700
CLOSEOUT 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 contract closeout, including, but not limited to, the following:
   1. Inspection procedures.
   2. Project Record Documents.
   3. Operation and maintenance manuals.
   4. Warranties.
   5. Instruction of Owner's personnel.
   6. Final cleaning.

B. Related Sections include the following:
   1. Section 01 2900 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
   2. Section 01 7300 "Execution Requirements" for progress cleaning of Project site.
   3. Section 01 7820 "Operation and Maintenance Data" for operation and maintenance manual requirements.
   4. Divisions 2 through 48 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
   6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
   7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. **Inspection:** Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
   2. Results of completed inspection will form the basis of requirements for Final Completion.

## 1.4 FINAL COMPLETION

### A. Preliminary Procedures:
Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

### B. Inspection:
Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

### C. Additional Review Fees:
Should Architect perform more than one additional review, or extend its construction period services more than 15 business days beyond the scheduled completion date, due to the failure of the Contractor's work to comply with the claims of status or completion made by the Contractor, Owner will compensate Architect for such additional/extended services at the rate of $500.00 per day. The Owner shall then deduct the amount of such compensation from the final payment to the Contractor.
1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of Contractors list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.

1.6 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.
   1. 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 cannot be readily identified and recorded 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.
      d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
   2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
   3. Mark important additional information that was either shown schematically or omitted from original Drawings.
   4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
   5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
C. **Record Specifications:** Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy 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. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   3. Note related Change Orders, Record Drawings, and Product Data, where applicable.

D. **Record Product Data:** Submit one copy of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.

E. **Miscellaneous Record Submittals:** 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.

1.7 **OPERATION AND MAINTENANCE MANUALS**

A. **Assemble a complete set of operation and maintenance data** indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:

   1. **Operation Data:**
      a. Emergency instructions and procedures.
      b. System, subsystem, and equipment descriptions, including operating standards.
      c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
      d. Description of controls and sequence of operations.
      e. Piping diagrams.

   2. **Maintenance Data:**
      a. Manufacturer's information, including list of spare parts.
      b. Name, address, and telephone number of Installer or supplier.
      c. Maintenance procedures.
      d. Maintenance and service schedules for preventive and routine maintenance.
      e. Maintenance record forms.
      f. Sources of spare parts and maintenance materials.
      g. Copies of maintenance service agreements.
      h. Copies of warranties and bonds.
B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title “OPERATION AND MAINTENANCE MANUAL,” Project name, and subject matter of contents.

1.8 WARRANTIES

A. **Submittal Time**: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. **Organize warranty documents** into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title “WARRANTIES,” Project name, and name of Contractor.

C. **Provide additional copies** of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. **Cleaning Agents**: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

A. **Instruction**: Instruct Owner’s personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Provide instructors experienced in operation and maintenance procedures.
   2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
   3. Schedule training with Owner, through Architect, with at least seven days' advance notice.
   4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
B. **Program Structure:** Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
1. System design and operational philosophy.
2. Review of documentation.
3. Operations.
4. Adjustments.
5. Troubleshooting.
7. Repair.

### 3.2 FINAL CLEANING

**A. General:** Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

**B. Cleaning:** Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer’s written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
      1) Use low VOC and low emitting cleaning products to the maximum extent feasible.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
   1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Replace parts subject to unusual operating conditions.

o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project clean and ready for occupancy.

C. **Cleaning Standards**: Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION
PROJECT CONTRACT NAME: Project Contract Name
ARCHITECTURAL FIRM: Architect Firm ARCH. PROJECT NO: ##
CONTRACTOR: Contractor

Record Drawings are required per the Owner / Architect contract agreement and shall consist of AutoCAD files (.dwg), BIM files (i.e. REVIT [.rvt], etc.), PDF (.pdf) files, Sheet Index (.xls), Renderings/Photos and Specifications as outlined below. Drawing files shall be separated into individual files with all external references (xrefs) and attached files (i.e. images, special fonts, pen settings, etc.) bound to each separate drawing. The AutoCAD, BIM and PDF files can be included under each discipline below in separate folders. Naming of these files shall be sequential and as outlined on the Architects Drawing Index. The file names shall not include any special characters and/or symbols (i.e. \ / : ; * ? " < > | # { } [ ] %. & etc.). By submitting Record Drawings to the Owner, Architect has verified that all content is functional and readable.

**RECORD DRAWING SHEET INDEX**
- [ ] Provide an Excel File (.xls) of complete drawing index.

**RECORD DRAWING DISCIPLINES**

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**RECORD SPECIFICATIONS**
- [ ] Separate into Divisions / Sections with T.O.C. (.pdf)

**RENDERINGS | PHOTOS**
- [ ]

REVIEWED BY: Architect ____________________________ DATE REVIEWED: 10/10/2012

SIGNATURE: _______________________________________

*This document is to be included in Division I specifications and kept with the Record Drawing file.*
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 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 systems and equipment.

B. Related Sections include the following:
1. Section 01 3313 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Section 01 7700 "Closeout Procedures" for submitting operation and maintenance manuals.
3. Divisions 2 through 48 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 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.

1.4 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit 2 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.
1.5 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 2 - PRODUCTS

2.1 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."

2.2 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.

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. Name and address of Architect.
   7. 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:** Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      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. **Dividers:** Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
   3. **Protective Plastic Sleeves:** Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
   4. **Supplementary Text:** Prepared on 8-1/2-by-11-inch white bond paper.
   5. **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.

E. **Coordinate final O&M manual data and delivery** with Commissioning Agent as required in LEED EA credit 3 "Enhanced Commissioning."

2.3 **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.
5. Power failure.
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.

### 2.4 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.
   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.

### 2.5 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.
   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.

### 2.6 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. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. 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. **Maintenance Service Contracts**: Include copies of maintenance agreements with name and telephone number of service agent.

H. **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.

**PART 3 - EXECUTIpN**

**3.1 MANUAL PREPARATION**

A. **Operation and Maintenance Documentation Directory**: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. **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.
C. **Product Maintenance Manual:** Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. **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.

E. **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.

F. **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."

G. **Comply with** Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

**END OF SECTION**
DIVISION 2 – EXISTING CONDITIONS

Section 02 4101  Cutting and Patching
Section 02 4102  Selective Demolition
SECTION 02 4101
CUTTING AND PATCHING

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 procedural requirements for cutting and patching.

B. The General Contractor is responsible to patch and repair any and all material disturbed during construction, this is to include but not limited to walls, floors, ceilings, asphalt, concrete, lawns and landscaping, roofs, etc.

1.3 DEFINITION

A. **Cutting**: Removal of existing construction necessary to permit installation or performance of other Work.

B. **Patching**: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. **Cutting and Patching Proposal**: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed.

   1. **Architect's Approval**: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. **Structural Elements**: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. **Operational Elements**: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety, including but not limited to the following:

   1. Primary operational systems and equipment.
   2. Fire-protection systems.
   3. Communication systems.
   4. Electrical wiring systems.
C. **Miscellaneous Elements**: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
   1. Piping, ductwork, vessels, and equipment.

D. **Visual Requirements**: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
   1. If possible, retain original Installer or fabricator to cut and patch exposed Work.
      If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.

E. **Cutting and Patching Conference**: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 **WARRANTY**

A. **Existing Warranties**: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

**PART 2 - PRODUCTS**

2.1 **MATERIALS**

A. **General**: Comply with requirements specified in other Sections of these Specifications.

B. **Existing Materials**: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

**PART 3 - EXECUTION**

3.1 **EXAMINATION**

A. **Examine surfaces** to be cut and patched and conditions under which cutting and patching are to be performed.
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 **PREPARATION**

A. **Temporary Support**: Provide temporary support of Work to be cut.
B. **Protection**: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. **Adjoining Areas**: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. **Existing Services**: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

### 3.3 PERFORMANCE

A. **General**: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. **Cutting**: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer’s written recommendations.
   1. **General**: Use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. **Existing Finished Surfaces**: Cut or drill from the exposed or finished side into concealed surfaces.
   3. **Concrete/Masonry**: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. **Mechanical and Electrical Services**: Cut off pipe or conduit to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   5. **Patching**: Proceed with patching after construction operations requiring cutting are complete.

C. **Patching**: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Patch masonry with masonry units and grout that match as closely as possible the original. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
   1. **Inspection**: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   2. **Exposed Finishes**: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

**END OF SECTION**
SECTION 02 4102
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.

B. Related Sections include the following:
   1. Section 02 4101 “Cutting and Patching” for cutting and patching procedures for selective demolition operations.

1.3 DEFINITIONS

A. Deconstruction: Disassembly of buildings for the purpose of recovering materials

B. Demolish: Completely remove and legally dispose of off-site.

C. Existing to Remain or Retain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled

D. Protect: Except as otherwise defined in greater detail, the term “protect” is used to describe the process of shielding from harm existing fixtures, elements or materials.

E. Protect and Maintain: To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.

F. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

G. Remove: To detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

H. Remove and Salvage: To detach items from existing construction and deliver them to Owner ready for reuse.

I. Remove and Reinstall: To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.
J. **Salvage:** Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner. Include fasteners or brackets needed for reattachment elsewhere.

K. **Stabilize:** To apply measures designed to reestablish a weather-resistant enclosure and the structural reinforcement of an item or portion of the building while maintaining the essential form as it exists at present.

1.4 **MATERIALS OWNERSHIP**

A. **Historic items, relics, and similar objects** including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 **SUBMITTALS**

A. **Qualification Data:** For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. **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.

C. **Schedule of items and materials to be salvaged:** Identify procedures for disassembly.
   1. Identify materials to be recycled. Identify materials to be salvaged for reuse on site and off site.

D. **Schedule of Selective Demolition Activities:** Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Locations of temporary partitions and means of egress.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

E. **Inventory:** After selective demolition is complete, submit a list of items that have been removed and salvaged.

F. **Pre-demolition Photographs or Videotape:** Show existing conditions of adjoining construction and site improvements, including finish surfaces, which might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

G. **Landfill Records:** Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.7 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. Hazardous materials will be removed by Owner before start of the Work.
   2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

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

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.
   1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   2. Use materials whose installed performance equals or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

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. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. 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.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

B. Utility Interruption: 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.

C. Provide at least 72 hours’ notice to Owner if shutdown of service is required during changeover.
D. **Utility Requirements**: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

E. **Owner will arrange to shut off indicated utilities** when requested by Contractor.

F. **If utility services are required to be removed**, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.

G. **Cut off pipe or conduit in walls** or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

H. **Utility Requirements**: Refer to Mechanical and Electrical Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

### 3.3 PREPARATION

A. **Dangerous Materials**: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. **Site Access and Temporary Controls**: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
   2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
   3. Protect existing site improvements, appurtenances, and landscaping to remain.

C. **Temporary Facilities**: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   3. Cover and protect furniture, furnishings, and equipment that have not been removed.

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

F. **Temporary Shoring:** Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

### 3.4 POLLUTION CONTROLS

A. **Temporary ventilation:** Provide temporary ventilation as follows:
   1. Vacuum old carpets prior to removal using a certified Carpet and Rug Institute (CRI) Green Label vacuum cleaner. Vacuum floor immediately after old carpet is removed.

B. **Dust Control:** Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
   1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
   2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

C. **Disposal:** Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

D. **Cleaning:** Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

### 3.5 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. Proceed with selective 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.
   2. 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.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. 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.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.
10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Existing Facilities: Comply with Owner’s requirements for using and protecting walkways, building entries, and other building facilities during selective demolition operations.

C. Removed and Salvaged Items: Comply with the following:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items: Comply with the following:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

F. Concrete: Neatly core drill openings in existing floor - verify locations of services in suspended slab and below before any cutting.

3.6 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.

C. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
D. **Floors and Walls:** Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, as noted on Drawings, to achieve uniform color and appearance.

1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
2. Skim coat entire wall surface with drywall compound to provide smooth, unblemished substrate for new paint finish.
3. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
4. Test and inspect patched areas after completion to demonstrate integrity of installation.

E. **Ceilings:** Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance. Replace damaged ceiling panels with new panels, matching existing.

### 3.7 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**
DIVISION 3 – CONCRETE

Section 03 3053  Cast-in Place Concrete (Limited Applications)
DIVISION 4 – MASONRY

Not Used
DIVISION 5 - METALS

Section 05 5000  Metal Fabrications
SECTION 05 5000
METAL FABRICATIONS

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. "Unistrut" structure.
   2. Steel framing and supports for countertops.
   3. Steel framing and supports for mechanical and electrical equipment.
   4. Steel framing and supports for applications where framing and supports are not specified in other Sections.

B. Related Sections include the following:
   1. Section 06 1053 "Miscellaneous Rough Carpentry" for metal framing anchors and other rough hardware.

1.3 SUBMITTALS

A. Shop Drawings General: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
   1. Provide templates for anchors and bolts specified for installation under other Sections.

B. Welding Certificates: Copies of certificates for welding procedures and personnel.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code--Steel."
   4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
1.5 PROJECT CONDITIONS

A. **Field Measurements General**: Where metal fabrications are indicated to fit walls and other construction, verify dimensions 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 metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

1.6 COORDINATION

A. **Coordinate installation of anchorages for metal fabrications**: Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. **Metal Surfaces, General**: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.

2.2 FERROUS METALS

A. **Steel Plates, Shapes, and Bars**: ASTM A 36/A 36M.

B. **Uncoated Hot-Rolled Steel Sheet**: Commercial quality, complying with ASTM A 569/A569M or structural quality, complying with ASTM A 570, Grade 30, unless another grade is required by design loads.

C. **Galvanized-Steel Sheet**: ASTM A 653/A 653M, Structural Steel (SS), G60 (Z180) zinc coating.

D. **Brackets, Flanges, and Anchors**: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

E. **Slotted Channel Framing**: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch wide slotted holes in webs at 2 inches o.c.
   1. **Width of Channels**: 1-5/8 inches.
   2. **Depth of Channels**: 1-5/8 inches.
   3. **Metal and Thickness**: Uncoated steel complying with ASTM A 570, Grade 33; 14 gauge minimum thickness.
   4. **Finish**: Rust-inhibitive, baked-on, acrylic enamel.

F. **Welding Rods and Bare Electrodes**: Select according to AWS specifications for metal alloy welded.
2.3 PAINT

A. **Shop Primer for Ferrous Metal**: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

   1. Refer to Section 09 9123 - Painting for specific primer required on identified steel items.

B. **Bituminous Paint**: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FASTENERS

A. **General**: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

B. **Bolts and Nuts**: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. **Anchor Bolts**: ASTM F 1554, Grade 36.

D. **Machine Screws**: ASME B18.6.3.

E. **Lag Bolts**: ASME B18.2.1.

F. **Wood Screws**: Flat head, carbon steel, ASME B18.6.1.

G. **Plain Washers**: Round, carbon steel, ASME B18.22.1


I. **Expansion Anchors**: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

   1. **Material**: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

J. **Toggle Bolts**: FS FF-B-588, tumble-wing type, class and style as needed.

2.5 FABRICATION, GENERAL

A. **Shop Assembly**: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. **Shear and punch** metals cleanly and accurately. Remove burrs.
C. **Ease exposed edges** to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. **Weld corners** and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. **Provide for anchorage** of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

F. **Cut, reinforce, drill, and tap metal fabrications** as indicated to receive finish hardware, screws, and similar items.

G. **Fabricate joints** that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

H. **Allow for thermal movement** resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

I. **Form exposed work true to line** and level with accurate angles and surfaces and straight sharp edges.

J. **Remove sharp or rough areas** on exposed traffic surfaces.

K. **Form exposed connections with hairline joints**, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

**2.6 MISCELLANEOUS FRAMING AND SUPPORTS**

A. **General**: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. **Fabricate units** from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Fabricate units from slotted channel framing where required for deflection.
   2. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches wide by 1/4 inch thick by 8 inches long at 24 inches o.c., unless otherwise indicated.
   3. Furnish inserts if units must be installed after concrete is placed.
2.7 MISCELLANEOUS STEEL TRIM

A. **Unless otherwise indicated**, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. **Provide cutouts, fittings, and anchorages as needed** to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

2.8 FINISHES, GENERAL

A. **Comply with NAAMM's** "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. **Finish metal fabrications** after assembly.

2.9 STEEL AND IRON FINISHES

A. **Preparation for Shop Priming**: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1. **Exteriors (SSPC Zone 1B)**: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

2. **Interiors (SSPC Zone 1A)**: SSPC-SP 3, "Power Tool Cleaning."

B. **Application**: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. **Fastening to In-Place Construction**: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.

B. **Cutting, Fitting, and Placement**: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. **Provide temporary bracing** or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
D. **Fit exposed connections accurately together to form hairline joints.** Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. **Field Welding:** Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. **Corrosion Protection:** Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

### 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. **General:** Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

### 3.3 ADJUSTING AND CLEANING

A. **Touchup Painting:** Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

**END OF SECTION**
DIVISION 6 – WOOD, PLASTICS, AND COMPOSITES

Section 06 4023  Interior Architectural Woodwork
SECTION 06 4023
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. This Section includes the following but is not limited to the following:
   1. Resurfacing of existing plastic laminate-clad cabinets.
   2. Solid-surface material countertops

1.3 DEFINITIONS
A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction prior to woodwork installation.

1.4 SUBMITTALS
A. Product Data: Product data for each type of product and process specified and incorporated into items of architectural woodwork during fabrication, finishing, and installation.

B. Shop Drawings: Provide shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show details full size.

C. Samples for verification of the following:
   1. Plastic-laminate-clad panel products, 8 by 10 inches, for each type, color, pattern, and surface finish.

1.5 QUALITY ASSURANCE

B. Installer Qualifications: Arrange for installation of architectural woodwork by a firm which can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this project.

C. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit.
1.6 DELIVERY, STORAGE, AND HANDLING

A. **Protect woodwork during transit**, delivery, storage, and handling to prevent damage, soilage, and deterioration.

B. **Do not deliver woodwork** until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions."

1.7 PROJECT CONDITIONS

A. **Environmental Limitations**: Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. **Field Measurements**: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.

2. Where field measurements cannot be made without delaying the Work, guarantee 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 guaranteed dimensions.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. **Fabricators**: Subject to compliance with requirements of Contract Documents, provide interior architectural woodwork by one of the following:

1. Huetter Mill and Cabinet Company.
2. Granite Mill and Fixture Company.
3. Swainston Mill.
4. Johnson Brothers.
5. Pacific Cabinets, Inc. of Ferdinand, ID.
6. Fondell Woodwork.
7. Artistic Mill
10. Other mills may submit for approval no later than 10 days before the date for receipt of bids. Mills need not be members of AWI or WI to receive consideration, however, quality shall conform to levels outlined in these specifications and Associations' reference standards.
B. **Acceptable Laminate Manufacturers**: Subject to compliance with requirements of Contract Documents, provide products listed below. If not listed, submit as a substitution according to Conditions of the Contract and the requirements of Division 1 Sections.
1. Wilsonart.

C. **Acceptable Solid Surface Manufacturers**: Subject to compliance with requirements of Contract Documents, provide products listed below. If not listed, submit as a substitution according to Conditions of the Contract and the requirements of Division 1 Sections.
1. DuPont; Corian.

### 2.2 MATERIALS

A. **General**: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade indicated and, where the following products are part of interior woodwork, with requirements of the referenced product standards that apply to product characteristics indicated:
2. Particleboard: ANSI A208.1, Grade M-2, made with phenol-formaldehyde resins (no urea formaldehyde).

B. **High-Pressure Decorative Laminate**: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.

C. **Adhesive for Bonding Plastic Laminate**: Contact cement.

D. **Solid Surfacing**:
1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
2. Superficial damage to a depth of 0.010 inch shall be repairable by sanding and/or polishing.
3. Thickness: 1/2 inch (or maximum thickness available in selected color/texture).
4. Adhesives: As recommended by quartz surfacing manufacturer for specific application.

### 2.3 MANUFACTURED UNITS

A. **Cabinets**:
1. Quality Standard: Comply with AWS Section 10, Custom grade, flush overlay design and the following:
2. Vertical Surface High Pressure Plastic Laminate:
   a. High pressure plastic laminate for exterior surfaces shall be NEMA vertical grade 0.028 inch thickness, satin finish. Colors are to be selected from manufacturer’s full color selection, including polished mirror types. Cabinet fronts for each individual cabinet shall be one color only.
   b. Balancing sheet on inside of doors, drawer fronts and finished ends shall be high pressure plastic laminate cabinet liner matching cabinet interior.
3. **Edge-banding:**
   a. 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 3mm radius and scraped free from machining or chatter marks. Color shall be as selected by Architect from manufacturers full color range.

### 2.4 MISCELLANEOUS MATERIALS

A. **Adhesives, General:** Adhesives shall not contain urea formaldehyde.

B. **VOC Limits for Installation Adhesives:** Installation adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a. Wood Glues: Not more than 30 g/L.
   b. Multipurpose Construction Adhesives: 70 g/L.
   c. Contact Adhesive: Not more than 250 g/L.

### 2.5 CABINET HARDWARE AND ACCESSORY MATERIALS

A. **General:** Reuse existing cabinet hardware and accessory materials associated with architectural cabinets, except where items are damaged or unusable, as judged by the Owner.

### 2.6 FABRICATION

A. **General:**
   1. **Wood Moisture Content:** Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.
   2. **Dimensions and profiles:** Fabricate woodwork to dimensions, profiles, and details indicated with openings and mortises precut, where possible, to receive hardware and other items and work.
   3. **Edges:** Ease edges to a 1/16 inch radius, for corners of cabinets and edges of solid wood (lumber) members less than 1 inch in nominal thickness, 1/8 inch radius for edges of rails and similar members over 1 inch in nominal thickness.
   4. **Pre-assembly:** Complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
   5. **Pre-Cut Openings:** Fabricate architectural woodwork with pre-cut openings, where possible, to receive hardware, appliances, plumbing fixtures, electrical work and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutoffs and, where located in countertops and similar exposures seal edges of cutouts with a water-resistant coating.
   6. **Door and Drawer Fronts:** Doors, drawer fronts, and false fronts shall be flush overlay. They shall align vertically and horizontally and be on the same plane as one another. Shall be installed free of: warp, twisting, cupping, and/or bowing that cannot be held true; open joints, visible machine marks, cross-sanding, tear-outs, nicks, chips, and/or scratches.
2.7 COMPONENT CONSTRUCTION

A. Core Material:
   1. Particleboard: Premium grade board of balanced construction with a density of 45 lbs. per cubic foot and moisture content of 8 percent or less. Face screw holding shall be a minimum of 320 lbs. withdrawal.

B. Doors and Drawer Fronts:
   1. Plastic Laminate Doors and Drawer Fronts: Plastic laminate doors and drawer fronts shall be 3/4 inch thick for all hinged and sliding doors with vertical grade high pressure plastic laminate exterior face and color cabinet liner on interior face white.
      a. Core material to be 11/16 inch thick.

C. Joinery:
   1. All parts shall be accurately machined and fit for square and true, within a tolerance not to exceed 1/32 inch difference in measurement at top versus bottom, and 1/16 inch diagonally.

2.8 SOLID-SURFACING-MATERIAL COUNTERTOPS

A. Quality Standard: Comply with AWS Section 11 requirements for countertops.
   1. Grade: Premium.

B. Solid-Surfacing-Material Thickness: 1/2 inch.

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
   1. As indicated on Legend-Finish Schedule or, if not indicated, as selected by Architect from manufacturer’s full range including colors and patterns from all price ranges.

D. 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. Fabricate tops with shop-applied backsplashes.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installing.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION

A. Install woodwork plumb, level, true, and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 96 inches for plumb and level (including tops).
B. **Scribe and cut woodwork** to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

C. **Anchor woodwork to anchors** or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork and matching final finish where transparent finish is indicated.

D. **Cabinets:** Install without distortion so that 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 the 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.

E. **Tops:** Anchor securely to base units and other support systems as indicated. Calk space between backsplash and wall with specified sealant.
   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 with concealed metal brackets at 16 inches o.c.

F. **Complete the finishing** work specified in this Section to the extent not completed at shop or before installation of woodwork.

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.

3.4 **PROTECTION**

A. **Provide final protection** and maintain conditions in a manner acceptable to fabricator and installer that ensures that woodwork is without damage or deterioration at the time of Substantial Completion.

END OF SECTION
DIVISIONS 7 thru 8

Not Used
DIVISION 9 – FINISHES

Section 09 2900  Gypsum Board
Section 09 5100  Acoustical Ceilings
Section 09 6513  Resilient Floor Coverings
Section 09 9123  Painting
SECTION 09 2900

GYPSUM BOARD

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. Interior gypsum board.

B. Related Sections include the following:
   1. Section 09 9123 “Painting” for primers applied to gypsum board surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
2.2 INTERIOR GYPSUM BOARD

A. **General:** Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Gypsum Co.
   b. G-P Gypsum.
   c. National Gypsum Company.
   d. PABCO Gypsum.
   e. USG Corporation.

B. **Type X:**

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

2.3 TRIM ACCESSORIES

A. **Interior Trim:** ASTM C 1047.

1. Material: Rolled zinc or aluminum only. Ferrous materials shall not be used.
2. Shapes:
   a. Cornerbead.
   b. Bullnose bead.
   c. LC-Bead: J-shaped; exposed long flange receives joint compound.
   d. L-Bead: L-shaped; exposed long flange receives joint compound.
   e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
   f. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

A. **General:** Comply with ASTM C 475/C 475M.

B. **Joint Tape:**

1. Interior Gypsum Wallboard: Paper.

C. **Joint Compound for Interior Gypsum Wallboard:** For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
2.5 AUXILIARY MATERIALS

A. **General:** Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. **Laminating Adhesive:** Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
   1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. **Drill Screws:** Non-ferrous only, as approved by MRI supplier and gypsum manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. **Examine areas and substrates,** with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. **Examine panels before installation.** Reject panels that are wet, moisture damaged, and mold damaged.

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. **Comply** with ASTM C 840.

B. **Install ceiling panels** across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. **Install panels with face side out.** Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. **Locate edge** and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. **Form control and expansion joints** with space between edges of adjoining gypsum panels.
F. **Cover both faces** of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. **Isolate perimeter** of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. **Type X**: Vertical surfaces, unless otherwise indicated.

B. **Single-Layer Application:**
   1. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
      a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
   2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. **Multilayer Application:**
   1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
   2. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

D. **Laminating to Substrate**: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

### 3.4 INSTALLING TRIM ACCESSORIES

A. **General**: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. **Control Joints**: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
C. **Interior Trim:** Install in the following locations:
1. **Cornerbead:** Use at outside corners, unless otherwise indicated.
2. **Bullnose Bead:** Use where indicated.
3. **LC-Bead:** Use at exposed panel edges.
4. **L-Bead:** Use where indicated.
5. **U-Bead:** Use at exposed panel edges.
6. **Curved-Edge Cornerbead:** Use at curved openings.

D. **Install corner beads** at external corners. Provide metal trim to protect edge of gypsum board wherever gypsum board intersects a dissimilar material. Hold channel and L trim back from metal window and door frames 1/8 inch to allow for caulking.

### 3.6 FINISHING GYPSUM BOARD

A. **General:** Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. **Prefill open joints,** rounded or beveled edges, and damaged surface areas.

C. **Apply joint tape** over gypsum board joints, except those with trim having flanges not intended for tape.

D. **Gypsum Board Finish Levels:** Finish panels to levels indicated below:
1. **Level 1:** Ceiling plenum areas, concealed areas, and where indicated.
2. **Level 2:** Panels that are substrate for tile.
3. **Level 5:** At all wall surfaces, except where noted otherwise above.
   a. Primer and its application to surfaces are specified in other Division 9 Sections.

### 3.7 PROTECTION

A. **Protect installed products** from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. **Remove and replace** panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
3.8 FIELD QUALITY CONTROL

A. **Above-Ceiling Observation:** Architect will conduct an above-ceiling observation before installing gypsum board ceilings and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

1. Notify Architect seven days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.

2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:
   a. Installation of 80 percent of lighting fixtures, powered for operation.
   b. Installation, insulation, and leak and pressure testing of water piping systems.
   c. Installation of air-duct systems.
   d. Installation of air devices.
   e. Installation of mechanical system control-air tubing.
   f. Installation of ceiling support framing.

**END OF SECTION**
SECTION 09 5100

ACOUSTICAL CEILINGS

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 work of this section.

1.2 SUMMARY

A. Section includes acoustical ceiling tile, suspension system and accessories.

1.3 SUBMITTALS

A. Product Data: Manufacturer’s product specifications and installation instructions for each acoustical ceiling material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications.
   1. Include manufacturer’s recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods which may be detrimental to finishes and acoustical performances.

B. Samples: Set of 6 inch x 4 inch square samples for each acoustical unit required, showing full range of exposed color and texture to be expected in completed work.
   1. Set of 12 inch long samples of each exposed runner and molding.

1.4 QUALITY ASSURANCE

A. Source Limitations:
   1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
   2. Suspension System: Obtain each type through one source from a single manufacturer.

B. Fire Performance Characteristics: Provide acoustical ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate marking of applicable testing and inspecting agency.
   1. Surface Burning Characteristics: As follows, tested per ASTM E 84.
      a. Flame Spread: 25 or less.
      b. Smoke Developed: 50 or less.
   2. Fire Resistance Ratings: As indicated by reference to design designation in UL "Fire Resistance Directory" or "FM Approval Guide", for floor, roof or beam assemblies in which acoustical ceilings function as a fire protective membrane; tested per ASTM E 119. Provide protection materials for lighting fixtures and air ducts to comply with requirements indicated for rated assembly.
C. **Seismic Standard:** Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

D. **Coordination of Work:** Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any).

1.5 **DELIVERY, STORAGE, AND HANDLING**

A. **Deliver acoustical ceiling units to project site** in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

B. **Before installing acoustical ceiling units,** permit them to reach room temperature and a stabilized moisture content.

C. **Handle acoustical ceiling units carefully** to avoid chipping edges or damaging units in any way.

1.6 **PROJECT CONDITIONS**

A. **Space Enclosure:** Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings completed, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.7 **COORDINATION**

A. **Coordinate layout and installation** of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire suppression system, and partition assemblies.

1.8 **EXTRA MATERIALS**

A. **Furnish extra materials described below** that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Panels: Full-size equal to 2.0 percent of quantity installed.
   2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
   4. Hold-Down Clips: Equal to 2.0 percent of amount installed.
PART 2 - PRODUCTS

2.1 MANUFACTURER

A. **Available Manufacturers**: Subject to compliance with requirements of Contract Documents, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following

1. **Suspension System**:
   a. Armstrong.
   b. Chicago Metallic Corp.
   c. USG/Donn Corp.
   d. National Rolling Mills, Inc.

2. **Acoustical Tile**:
   a. Armstrong.
   b. CertainTeed.
   c. USG.

3. **Acoustical Sealant**:
   a. Tremco Acoustical Sealant; Tremco.
   b. USG Acoustical Sealant; United States Gypsum Co.
   c. Chem-Calk 600; Woodmont Products, Inc.
   d. Pecora Corp; AC 20 FTR Acoustical and Insulation Sealant

2.2 MATERIALS

A. **Basis of Design**: Contract Documents are based on products specified below to establish a standard of quality. Other manufacturers offering products with equivalent characteristics may be considered provided deviations are minor and design concept as expressed in the Contract Documents is not changed, as judged by the Architect.

1. **Manufacturer**: Armstrong World Industries, Inc.
2. **Product**: Optima® Health Zone™ (3114PB)

B. **Acceptable Manufacturers**: Subject to compliance with requirements of Contract Documents, provide products by one of the following manufacturers:

1. Armstrong World Industries
2. CertainTeed, a brand of Saint Gobain.
3. USG.

C. **Acoustical Ceiling Units**:

1. **General**: Provide manufacturer's standard units of configuration indicated which are prepared for mounting method designated and which comply with FS SS-S-118 requirements, including those indicated by reference to type, form, pattern, grade (NRC or NIC's as applicable), light reflectance coefficient (LR), edge detail, and joint detail (if any).

2. **Mounting Method for Measuring NRC**: No. 7 (mechanically mounted on special metal support), FS SS-S-118; or Type E-400 mounting as per ASTM E 795.

3. **Sound Attenuation Performance**: Provide acoustical ceiling units with ratings for ceiling sound transmission class (STC) of range indicated as determined according to AMA 1-II "Ceiling Sound Transmission Test by Two-Room Method" with ceilings continuous at partitions and supported by a metal suspension system of type appropriate for ceiling unit of configuration indicated (concealed for tile, exposed for panels).
D. **Ceiling Type A:**
1. Size: 24 inch x 24 inch x 1 inch.
2. Edge: Square lay-in.
3. CAC: N/A.
4. LR: 0.86.
5. NRC: 0.95.
6. ASTM E1264 Classification: Type XII, Form 2, Pattern E.
7. Material: Fiberglass with "Durabrite" acoustically transparent membrane with factory-applied vinyl latex paint

E. **Metal Suspension System:** Provide metal suspension systems of type, structural classification and finish indicated which comply with applicable ASTM C 635 requirements.
1. Finishes and Colors: Provide manufacturer's standard finish for type of system indicated, unless otherwise required. For exposed suspension members and accessories with painted finish, provide color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range of standard colors.
2. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.
3. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, pre-stretched. Class 1 coating, sized so that stress at 3-times hanger design load (ASTM C 635, Table 1, Direct Hung), will be less than yield stress of wire, but provide not less than 12 gage.
4. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
   a. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
   b. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
   c. Provide shadow reveal molding with width of reveal equal to depth of reveal.
5. Hold-Down Clips: Minimum 24 gauge spring steel, 1-7/16 inches deep x 7/8 inches wide, designed to fit over cross tees. Provide clips spaced symmetrically 2 ft. o.c.
6. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces. Provide struts at 12 feet on center both ways for all suspended ceilings according to UBC Standard 25-2.
   a. In lieu of compression struts, provide a seismic clip with an ES Report number from ICC demonstrating that the compression struts and the 2 inch perimeter wall mold are not required.
   b. Acceptable Manufacturers: Subject to compliance with the requirements of Contract Documents, provide seismic clips by one of the following manufacturers:
      1) Armstrong; BERC seismic clip.
      2) Chicago Metallic; 1496 Perimeter Clip.
      3) USG; ACM-7 clip
7. **Wide-Face, Capped, Double-Web, Hot-dipped Galvanized Steel Suspension System:** Main and cross runners roll formed from steel sheet, pre-painted, with pre-finished 15/16-inch- wide metal caps on flanges.
   a. **Basis of Design:** Contract Documents are based on system specified below to establish a standard of quality. Other manufacturers offering products with equivalent characteristics may be considered; provided deviations are minor and design concept as expressed in the Contract Documents is not changed, as judged by the Architect.
      1) Manufacturer: Armstrong World Industries, Inc.
      2) System: Armstrong Prelude® Plus XL® - 15/16 inch Exposed Tee.
   b. **Characteristics:**
      1) Structural Classification: Heavy-duty system.
      2) End Condition of Cross Runners: Over-ride type.
      3) Face Design: Flat, flush.
      4) Finish: Painted in color as selected from manufacturer's full range.

D. **Miscellaneous Materials:**
   1. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

A. **Coordination:** Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
   1. Furnish concrete inserts, steel deck hanger clips and similar devices to other trades for installation well in advance of time needed for coordination of other work.

B. **Layout:** Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

**3.2 INSTALLATION**

A. **General:** Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to work.

B. **Arrange acoustical units** and orient directionally-patterned units (if any) in manner shown by reflected ceiling plans.
   1. Install tile with pattern running in one direction.

C. **Install suspension systems** to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers not less than 6 inches from each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8" in 12'-0". Comply with detail on drawings for seismic bracing.
D. **Secure wire hangers** by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, countersplaying or other equally effective means.

E. **Install edge moldings** of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

1. Screw-attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.

F. **Install** acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

1. Paint cut and exposed edges of acoustical tile.
2. Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.

### 3.3 ADJUST AND CLEAN

A. **Clean exposed surfaces** of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION
SECTION 09 6513
RESILIENT FLOOR COVERINGS

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:
   1. Vinyl sheet floor coverings, including integral coved base.

B. Related Sections:
   1. Section 09 6520 "Resilient Wall Base and Accessories" for resilient wall base, stair treads, reducer strips, and other accessories installed with vinyl and rubber tile floor coverings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:
   1. Show locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   2. Show details of special patterns.

C. Samples:
   1. Include similar samples of installation accessories involving color selection.
   2. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

D. Heat-Welded Seam Samples: For each flooring product and welding bead color and pattern combination required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to rigid backing and prepared by Installer for this Project.

E. Maintenance Data: For floor coverings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project that are competent in techniques required by manufacturer for floor covering installation indicated.

B. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.
1.5 DELIVERY, STORAGE, AND HANDLING

A. **Store floor coverings and installation materials** in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 degrees F or more than 90 degrees F.

1.6 PROJECT CONDITIONS

A. **Maintain temperatures** within range recommended by manufacturer, but not less than 70 degrees F or more than 95 degrees F, in spaces to receive floor tile during the following time periods:
   1. 72 hours before installation.
   2. During installation.
   3. 72 hours after installation.

B. **After post-installation period**, maintain temperatures within range recommended by manufacturer, but not less than 55 degrees F or more than 95 degrees F.

C. **Close spaces to traffic during** floor covering installation.

D. **Close spaces to traffic for 72 hours after** floor covering installation.

E. **Install floor coverings after other finishing operations**, including painting, have been completed.

1.7 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. **Sheet Goods**: Furnish not less than 10 linear feet in full roll width for every 500 linear feet or fraction thereof, in roll form and in full roll width, of each different type, color, and pattern of sheet floor covering installed.

PART 2 - PRODUCTS

2.1 SHEET VINYL FLOOR COVERING

A. **Acceptable Manufacturer**: Subject to compliance with requirements of Contract Documents, provide products by the following manufacturer.
   1. Manufacturer: Mannington Commercial
   2. Products: Biospec SR (slip resistant)

B. **Colors and Patterns**: As indicated on Legend-Finish Schedule on Drawings.

C. **Sheet Floor Covering**: Complying with ASTM F 1303, Type 1, Grade 1, Class B, and consisting of a urethane wear layer with aluminum oxide, cured by ultraviolet process. Patterns and colors shall extend through entire wear-layer thickness.
   1. **Roll Size**: In manufacturer's standard length by not less than 78 inches wide.
D. **Seaming Method**: Heat welded.

E. **Overall Thickness**: 0.080 inch.

F. **Fire-Test-Response Characteristics**:
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

### 2.2 INSTALLATION MATERIALS

A. **Trowelable Leveling and Patching Compounds**: Latex-modified, Portland cement based or blended hydraulic cement based formulation provided or approved by floor covering manufacturer for applications indicated.

B. **Adhesives**: Water-resistant type recommended by floor covering manufacturer for products and substrate conditions indicated.

C. **Heat-Welding Bead**: Solid-strand product of floor covering manufacturer.

D. **Coved Base Accessories**: Cove forms and cap pieces, as selected by Architect from manufacturer's full range.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. **Examine substrates**, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

A. **Prepare substrates** according to manufacturer's written recommendations to ensure adhesion of floor coverings.

B. **Concrete Substrates**: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
   3. Moisture Testing:
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1000 sq. ft. in 24 hours.
      b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
C. **Remove substrate coatings and other substances** that are incompatible with floor covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. **Use trowelable leveling and patching compound** to fill cracks, holes, and depressions in substrates.

E. **Move floor coverings and installation materials** into spaces where they will be installed at least 72 hours in advance of installation.
   1. Do not install floor coverings until they are the same temperature as the space where they are to be installed.

F. **Sweep and vacuum clean substrates** to be covered by floor coverings immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 INSTALLATION, GENERAL

A. **Scribe and cut floor coverings** to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.

B. **Extend floor coverings** into toe spaces, door reveals, closets, and similar openings.

C. **Maintain reference markers**, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on subfloor. Use chalk or other nonpermanent marking device.

D. **Install floor coverings** on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of floor coverings installed on covers. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.

E. **Adhere floor coverings to substrates** using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

F. **Heat-Welded Seams**: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.

### 3.4 SHEET FLOOR COVERING INSTALLATION

A. **Unroll sheet floor coverings** and allow them to stabilize before cutting and fitting.
B. **Lay out sheet floor coverings** as follows:
   1. Maintain uniformity of floor covering direction.
   2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
   3. Match edges of floor coverings for color shading at seams.
   4. Avoid cross seams.
   5. Eliminate deformations that result from hanging method used during drying process (stove bar marks).

C. **Integral-Flash-Cove Base**: Cove flooring to dimension indicated up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Butt at top against cap strip.

3.5 **CLEANING AND PROTECTION**

A. Perform the following operations immediately after installing floor coverings:
   1. Remove adhesive and other surface blemishes from floor covering surfaces.
   2. Sweep and vacuum floor coverings thoroughly.
   3. Damp-mop floor coverings to remove marks and soil.
      a. Do not wash floor coverings until after time period recommended by manufacturer.

B. **Protect floor coverings** against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended in writing by manufacturer.
   1. Apply protective floor polish when recommended by flooring manufacturer or as directed by Architect to surfaces that are free of soil, visible adhesive, and surface blemishes.
      a. Seal as recommended by manufacturer but with not less than three coats of floor polish.
      b. Use commercially available product acceptable to manufacturer.
      c. Coordinate selection of floor polish with Owner's maintenance service.
   2. Cover vinyl and rubber floor coverings with undyed, untreated building paper until inspection for Substantial Completion.
   3. Do not move heavy and sharp objects directly over floor covering surfaces. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

**END OF SECTION**
SECTION 09 9123
PAINTING

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 work of this section.

1.2 SUMMARY

A. Section includes painting work, interior and exterior. Work includes, but is not limited to
   painting the following:
   1. Metal doors, metal door frames, grilles, frames and fire extinguisher cabinet doors.
   2. Interior walls and ceilings.
   3. Interior wood including but not limited to trim, moldings and miscellaneous items.
   4. Work includes field painting of exposed bare and covered pipes and ducts
      (including color coding), and of hangers, exposed steel and iron work, plug mold,
      electric panels, and primed metal surfaces of equipment installed under
      mechanical and electrical work, except as otherwise indicated.

B. Related Sections:
   1. Finish Legend on Drawings for product selections and colors.
   3. Shop Primers: Unless otherwise specified, shop priming of ferrous metal items
      is included under various sections for structural steel, metal fabrications, hollow
      metal work and similar items.
      a. Unless otherwise specified, shop priming of fabricated components such
         as architectural woodwork, wood casework and shop-fabricated or
         factory-built mechanical and electrical equipment or accessories is
         included under other sections of these specifications.
      b. Comply with PDCA Standard P15 “Painting of Shop Primed Substrates”

C. "Paint" as used herein means all coating systems materials, including primers, emulsions,
   enamels, stains, sealers and fillers, and other applied materials whether used as prime,
   intermediate or finish coats.

D. Gloss and Sheen Definitions shall determine the equivalency of the desired finish luster
   when described in the construction documents by a traditional name instead of gloss units
   due to the wide variance of sheen descriptions available from manufacturer to
   manufacturer. Gloss shall be determined by ASTM D523 - 08 Standard Test Method for
   Specular Gloss.
   1. Flat: Refers to a lusterless or matte finish with a gloss range below 5 units when
      measured with a 60 degree meter and no more than 10 units measured at an 85
      degree meter.
   2. Low-Sheen: Refers to a velvet-like finish with a gloss range below 10 units when
      measured with a 60 degree meter and between 10-35 units measured at an 85
      degree meter.
   4. Satin: Refers to low-to-medium range finish with a gloss range between 20-35
      units when measured with a 60 degree meter and at least 35 units measured at an
      85 degree meter.
5. Semi-Gloss: Refers to a medium sheen finish with a gloss range between 35-70 units when measured with a 60 degree meter.
6. Gloss: Refers to a high sheen finish with a gloss range between 70-85 units when measured with a 60 degree meter.
7. High-Gloss: Refers to a very high sheen finish with a gloss range more than 85 units when measured with a 60 degree meter.

E. **Drywall Finishing Levels:** Except where otherwise specified, a Drywall Finishing Level 5 is required on gypsum board substrates scheduled to receive an eggshell or higher sheen. Drywall Finishing Level 4 is acceptable with the use of flat and low-sheen paints, except where critical lighting conditions are determined to be an issue by the Architect.

F. **Surfaces to be Painted:** Except where natural finish of material is specifically noted as a surface not to be painted, paint all exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect will select these from manufacturer's full range of colors and finishes. Multiple colors will be selected by the Architect for any type of paint system. If colors are not indicated on the drawings, provide for a minimum of 20 percent of the walls to be an accent color.
   1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
   2. Walls behind scheduled coverings shall receive prime coat.
   3. If it can be seen, paint it.

G. **Following categories of work are not included** as part of field-applied finish work:
   1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) metal toilet enclosures, pre-finished partition systems, architectural woodwork and casework, elevator entrance doors and frames, elevator equipment, and finished mechanical and electrical equipment, including light fixtures, switchgear and distribution cabinets.
   2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces and duct shafts.
   3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
   4. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts will not require finish painting.
   5. Labels: Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.3 **SUBMITTALS**

A. **Product Data:** Submit manufacturer's technical information including Paint label analysis and application instructions for each material proposed for use.

B. **Sustainability:** For paints and coatings, printed statement of VOC content demonstrating conformance to Utah Air Quality Regulations (R307-361).
C. **Samples:** Prior to beginning work, review Legend-Finish for colors to be painted. Use representative colors when preparing samples for review. Submit samples for Architect’s review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

1. On 12 inch x 12 inch hardboard, provide two samples of each color and material, with texture to simulate actual conditions. Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved.

2. On actual wood surfaces, provide two 4 inch x 8 inch samples of natural and stained wood finish. Label and identify each as to location and application.

3. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes of prepared samples. Refer to “Mockups” below.

1.4 **QUALITY ASSURANCE**

A. **Single Source Responsibility:** Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. **Coordination of Work:** Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

C. **Mockups:** Apply full-coat mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Simulate finished lighting conditions for review of in-place work.

1. Architect will select one surface, except as noted below, to represent surfaces and conditions for application of each paint system.

   a. **Vertical and Horizontal Surfaces:** Provide samples of at least 100 sq. ft.

   b. **Other Items:** Architect will designate items or areas required.

   c. **Masonry to Receive Clear Coat:** Provide free-standing samples of honed masonry, 48 inches x 48 inches for initial review of clear coat.

2. Final approval of color selections will be based on mockups.

   a. If preliminary color/sheen selections are not approved, apply additional mockups of additional colors/sheens selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 **DELIVERY AND STORAGE**

A. **Deliver materials** to job site in original, new and unopened packages and containers bearing manufacturer’s name and label, and following information:

1. Name or title of material.

2. Federal Specification number, if applicable.

3. Manufacturer’s batch number and date of manufacture.

4. Manufacturer’s name.

5. Contents by volume, for major pigment and vehicle constituents.

6. Thinning instructions.

7. Application instructions.

8. Color name and number.
B. **Store materials** not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

   1. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

### 1.6 PROJECT CONDITIONS

A. **Apply water-based paints** only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degrees F, unless otherwise permitted by paint manufacturer's printed instructions.

B. **Apply solvent-thinned paints** only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F, unless otherwise permitted by paint manufacturer's printed instructions.

C. **Do not paint in snow, rain, fog or mist**, or when relative humidity exceeds 85 percent, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.

   1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

D. **Determine moisture content of surfaces** to be painted by performing appropriate tests using a commercially available moisture meter. Apply paint only when surfaces are within limits specified by the paint manufacturer’s printed instructions.

### 1.7 MAINTENANCE MATERIALS

A. **Furnish extra materials** that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Paint: 5 percent, but not less than 1 gallon of each material and color applied.

   2. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

### PART 2 - PRODUCTS

### 2.1 MANUFACTURER

A. **Basis of Design Manufacturer**: Contract Documents are based on products specified in Part 3 Schedules to establish a standard of quality. Other acceptable manufacturers offering products with equivalent characteristics may be considered, provided deviations are minor and design concept as expressed in the Contract Documents is not changed, as judged by the Architect.

   1. Manufacturer: Sherwin-Williams Company.
B. **Acceptable Manufacturers:** Subject to compliance with requirements of Contract Documents, provide products by one of the following manufacturers.
   1. PPG Industries, Pittsburgh Paints.
   2. The Sherwin-Williams Company (S-W).

2.2 **MATERIALS**

A. **Low-Emitting Materials - VOC Content** (Utah Administrative Code R307-361): Products shall comply with VOC limits of authorities having jurisdiction and, for interior and exterior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24]).
   1. Flat Paints and Coatings: 50 g/L.
   2. Nonflat Paints and Coatings: 100 g/L.
   3. Dry-Fog Coatings: 150 g/L.
   4. Primers, Sealers, and Undercoaters: 100 g/L.
   5. Industrial maintenance Coatings Applied to Ferrous Metals: 250 g/L.
   7. Pretreatment Wash Primers: 420 g/L.
   8. Floor Coatings Foot Traffic: 100 g/L.
   9. Floor Coatings High Performance: 250 g/L.
   10. Shellacs, Clear: 730 g/L.
   11. Shellacs, Pigmented: 550 g/L.
   12. Wood Coatings: 275 g/L

B. **Material Quality:** Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

C. **Proprietary names** used to designate color or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

D. **Federal Specifications** establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

E. **Manufacturer's products** which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance to Architect for any proposed substitutions.

F. **Color Pigments:** Pure, non-fading, applicable types to suit substrates and service indicated.

G. **Lead content in pigment,** if any, is limited to contain not more than 0.009 percent lead, as lead metal based on the total non-volatile (dry-film) of paint by weight.
   1. This limitation is extended to interior surfaces and those exterior surfaces, such as stairs, decks, porches, railings, windows, and doors which are readily accessible to children under seven years of age.
PART 3 - EXECUTION

3.1 EXAMINATION

A. **Applicator must examine areas** and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.
   1. Comply with PDCA Standard P4 “Responsibility for Inspection and Acceptance of Surfaces prior to Painting and Decorating

B. **Starting of painting work** will be construed as Applicator’s acceptance of surfaces and conditions within any particular area.

C. **Do not paint over dirt**, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 PREPARATION

A. **General**: Perform preparation and cleaning procedures in accordance with paint manufacturer’s instructions and as herein specified, for each particular substrate condition.

B. **Barrier Coats**: Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.

C. **Accessories Removal**: Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

D. **Surface Preparation**: Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

E. **Ferrous Metals**: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
   1. Caulk fabrication joints in hollow metal door frames which paint application cannot bridge.
   2. Follow manufacturer’s surface preparation recommendations for ferrous metal substrates, ranging from one of the following procedures:
      a. SSPC-SP 1 - Solvent Cleaning (Nov-04)
      b. SSPC-SP 2 - Hand Tool Cleaning (Nov-04)
      c. SSPC-SP 3 - Power Tool Cleaning (Nov-04)
      d. SSPC-SP 5/NACE No. 1 - White Metal Blast Cleaning (Jan-07)
      e. SSPC-SP 6/NACE No. 3 - Commercial Blast Cleaning (Jan-07)
      f. SSPC-SP 7/NACE No. 4 - Brush-Off Blast Cleaning (Jan-07)
g. SSPC-SP 8 - Pickling (Nov-04)
h. SSPC-SP 10/NACE No. 2 - Near-White Metal Blast Cleaning (Jan-07)
i. SSPC-SP 11 - Power Tool Cleaning to Bare Metal (July-12)
j. SSPC-SP 14/NACE No. 8 - Industrial Blast Cleaning (Jan-07)
k. SSPC-SP 15 - Commercial Grade Power-Tool Cleaning (July-12)
l. SSPC-SP 16 - Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals (Apr-10)

G. Touch-up: Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.


I. Materials Preparation:
1. Mix and prepare painting materials in accordance with manufacturer's directions.
2. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
3. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.3 APPLICATION

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes, are indicated in “schedules” of the contract documents.
2. Provide finish coats which are compatible with prime paints used.
3. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
7. Finish doors on tops, bottoms and side edges same as faces, unless otherwise indicated.
8. Sand lightly between each succeeding enamel or varnish coat.
9. Omit first coat (exterior faces) of surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Re-coat Time: Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firms, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
2. Minimum Coating Thickness: Apply materials at not less than manufacturer’s recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

C. **Mechanical and Electrical Work:** Painting of mechanical and electrical work is limited to those items exposed to mechanical equipment rooms and in occupied spaces.
   1. Mechanical items to be painted include, but are not limited to, the following:
      a. Piping, pipe hangers, and supports.
      b. Roof mounted mechanical units.
      c. Ductwork, where exposed in occupied spaces.
      d. Motor, mechanical equipment, and supports.
      e. Accessory items.
   2. Electrical items to be painted include, but are not limited to, the following:
      a. Conduit and fittings.

D. **Prime Coats:** Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
   1. Reccoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

E. **Pigmented (Opaque) Finishes:** Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

F. **Completed Work:** Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

### 3.4 FIELD QUALITY CONTROL

A. **Owner will engage services of an independent testing laboratory** to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
   1. Testing laboratory will perform appropriate tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.

B. **If test results show** that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

### 3.5 CLEAN-UP AND PROTECTION

A. **Clean-Up:** During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.
   1. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using car not to scratch or otherwise damage finished surfaces.

B. **Protection:** Protect work of other trades, whether to be painted or not, against damage
by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

1. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

2. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

### 3.6 INTERIOR PAINT SCHEDULE

**A. General:** Provide the following paint systems for the various substrates as indicated below or equivalent system from approved manufacturers listed above.

**B. Metal** - (Interior Structural Steel - Columns, Joists, Trusses, Beams - Misc. & Ornamental Iron, Doors, Door Frames, Non-Galvanized Metal)

Sherwin-Williams - Latex (100% Acrylic) Systems

1st Coat: S-W Pro Industrial Pro-Cry Universal Primer B66-310 Series

Finish: Low sheen.

Thickness: (Mils per coat) 5 - 10 wet; 2 - 4 dry.

VOC: Less than 100 g/L

2nd Coat: S-W Pro Industrial Zero VOC Acrylic Gloss, B66-600 Series

3rd Coat: S-W Pro Industrial Zero VOC Acrylic Gloss, B66-600 Series

Finish: Gloss

Thickness: (Mils per coat) 6 - 12 wet; 2.5 - 4 dry.

**C. Gypsum Board** (Walls, etc.)

Sherwin-Williams - Vinyl Acrylic Systems

1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W02600 Series

Finish: Flat

Sheen (at 85 degrees): 0 - 5 units.

Thickness: (Mils per coat) 4 wet; 1.5 dry.

VOC: 0 g/L


Finish: Semi-Gloss

Sheen (at 60 degrees): 25 - 35 units

Thickness: (Mils per coat) 4 wet; 1.6 dry.

VOC: 0 g/L
D. **Gypsum Board** (Interior Graphics, Deep Tone Accents, Special Features, Etc.)

Sherwin-Williams - Vinyl Acrylic

1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 Series

Finish: Flat
Sheen (at 85 degrees): 0 - 5 units
Thickness: (Mils per coat) 4 wet; 1.5 dry.
VOC: 0 g/L

2nd Coat: S-W ProMar 200 Zero VOC Semi-Gloss B31-2600 series

3rd Coat: S-W ProMar 200 Zero VOC Semi-Gloss B31-2600 series

Sheen (at 60 degrees): 25 - 35 units.
Thickness (Mils per coat): 4 wet; 1.6 dry.
VOC: 0 g/L

E. **Gypsum Board** (Interior behind Wall Panels, Casework etc.)

Sherwin-Williams - Vinyl Acrylic


Finish: Flat
Sheen (at 85 degrees): 0 - 5 units
Thickness: (Mils per coat) 4 wet - 1.5 dry.
VOC: 0 g/L

END OF SECTION
DIVISIONS 10 thru 21

Not Used
## DIVISION 22 - PLUMBING

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SECTION 22 0719
PLUMBING PIPING 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 plumbing piping services:

      1. Domestic cold-water piping.
      2. Domestic hot-water piping.
      3. Domestic recirculating hot-water piping.
      4. Roof drains and rainwater leaders.
      5. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 DEFINITIONS:
   A. Refer to Section 220500 “Common Work Results for Plumbing”.

1.4 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 attachment and covering of heat tracing inside insulation.
      3. Detail insulation application at pipe expansion joints for each type of insulation.
      4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each
         type of insulation.
      5. Detail removable insulation at piping specialties, equipment connections, and access
         panels.
      6. Detail application of field-applied jackets.
      7. Detail application at linkages of control devices.

1.5 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.

1.6 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 E84 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.

1.7 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.

1.8 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.9 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 “Piping Insulation Schedule, General,” “Indoor Piping Insulation Schedule,” “Outdoor, Aboveground Piping Insulation Schedule,” and “Outdoor, Underground Piping Insulation Schedule” articles for where insulating materials shall be applied.

B. Insulation for below-ambient service requires a vapor-barrier.

C. Products shall not contain asbestos, lead, mercury, or mercury compounds.

D. 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.

E. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

F. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular 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-Lock, Insul-Tube, and K-FLEX LS.

H. Mineral Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553:
   1. Type II and ASTM C 1290, Factory-applied jacket requirements are specified in “Factory- Applied Jackets" Article.
   2. 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.

I. Mineral-Fiber, Preformed Pipe Insulation:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Fibrex Insulations Inc.; Coreplus 1200.
      b. Johns Manville; Micro-Lok.
      c. Knauf Insulation; 1000-Degree Pipe Insulation.
      d. Manson Insulation Inc.; Alley-K.
      e. Owens Corning; Fiberglas Pipe Insulation.
2. Type I, 850 Deg F. Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A.
   a. Without factory-applied jacket with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

J. Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

2.2 INSULATING CEMENTS

   1. Products: Subject to compliance with requirements, provide the following:
      a. Ramco Insulation, Inc.; Super-Stik.

   1. Products: Subject to compliance with requirements, provide the following:
      a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

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 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; Armadux 520 Adhesive.
      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:
      b. Eagle Bridges - Marathon Industries; 225.
      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).

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Eagle Bridges - Marathon Industries; 225.
   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).

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dow Corning Corporation; 739, Dow Silicone.
   d. Speedline Corporation; Polyco VP 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).

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:
   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.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:
b. Eagle Bridges - Marathon Industries; 501.
d. Mon-Eco Industries, Inc.; 55-10.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 deg F.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. Eagle Bridges - Marathon Industries; 570.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.

E. 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:
   b. Eagle Bridges - Marathon Industries; 550.
   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.

2.5 SEALANTS

A. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide the following:

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.
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).

2.6 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. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Johns Manville; Zeston.
   c. Proto Corporation; LoSmoke.
   d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.

3. Color: Color-code jackets based on system.
   a. White.

4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

C. Metal Jacket:

1. Products: Subject to compliance with requirements, provide one of the following:
   b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
   c. RPR Products, Inc.; Insul-Mate.

   a. Sheet and roll stock ready for shop or field sizing or factory cut and rolled to size.
   b. Finish and thickness are indicated in field-applied jacket schedules.
c. Moisture Barrier for Indoor Applications: 1-mil-thick, heat-bonded polyethylene and kraft paper. [3-mil-thick, heat-bonded polyethylene and kraft paper] [2.5-mil-thick polysurlyn].

d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper. [2.5-mil-thick polysurlyn].

e. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.
2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
3) Tee covers.
4) Flange and union covers.
5) End caps.
6) Beveled collars.
7) Valve covers.
8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.8 TAPES

A. ASJ Tape: White 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; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 370 White PVC tape.
   b. Compac Corporation; 130.
   c. Venture Tape; 1506 CW NS.

2. Width: 2 inches.
3. Thickness: 6 mils.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

C. 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.

### 2.9 SECUREMENTS

**A.** Staples: Outward-clinching insulation staples, nominal 3/4-inch wide, stainless steel or Monel.

### 2.10 PROTECTIVE SHIELDING GUARDS

**A.** Protective Shielding Pipe Covers:

1. **Manufacturers:** Subject to compliance with requirements provide products by one of the following:
   
   a. Engineered Brass Company.
   b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.
   c. McGuire Manufacturing.
   d. Plumberex.
   e. Truebro; a brand of IPS Corporation.
   f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. **Description:** Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

**B.** Protective Shielding Piping Enclosures:

1. **Manufacturers:** Subject to compliance with requirements provide products by one of the following:
   
   a. Truebro; a brand of IPS Corporation.
   b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. **Description:** Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.
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.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

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 piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe 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. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. 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.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer’s recommended coverage rate and wet and dry film thicknesses.

L. 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. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at:
   a. 2 inches 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 pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. 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.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
   1. Seal penetrations with flashing sealant.
   2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
   3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
   4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
   1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:
   1. Pipe: Install insulation continuously through floor penetrations.
   2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
   1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
   2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
   3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
   4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe
insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box stud, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word “union.” Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.
3.6 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.

B. Insulation Installation on Pipe Flanges:
   1. Install pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
   4. Secure insulation to flanges and seal seams with manufacturer’s recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install mitered sections of pipe insulation.
   2. Secure insulation materials and seal seams with manufacturer’s recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed valve covers manufactured of same material as pipe insulation when available.
   2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.
   4. Secure insulation to valves and specialties and seal seams with manufacturer’s recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
   2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
   3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
   4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's 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.

B. 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.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Insulation shall have a k value that meets the minimum requirements of the latest International Energy Conservation Code (IECC).

C. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1-1/2 and Smaller: Insulation shall be one of the following:
   a. Flexible Elastomeric:
      1) 1 inch thick
      2) .
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I:
      1) 1 inch thick

2. NPS 2 and Larger: Insulation shall be one of the following:
   a. Flexible Elastomeric:
      1) 1-1/2 inches thick
   b. Mineral-Fiber, Preformed Pipe Insulation:
      1) 1-1/2 inches thick.

B. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/2 and Smaller: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I:
      1) 1 inch thick.

2. NPS 2 and Larger: Insulation shall be the following:
   a. Mineral-Fiber, Preformed Pipe Insulation, Type I:
      1) 1-1/2 inches thick.

C. Domestic Chilled Water (Potable):

1. All Pipe Sizes: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

D. Storm water and Overflow:

1. All Pipe Sizes: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

E. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be one of the following:
   a. Flexible Elastomeric: 1 inch thick.
   b. Mineral-Fiber, Blanket Insulation, Type I: 1 inch thick.
   c. Drain Manufacturer’s Pre-formed bowl Insulation: 1 inch thick.
F. Sanitary Waste Piping Where Heat Tracing Is Installed:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.

G. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:
   1. All Pipe Sizes: Insulation shall be one of the following:
      a. Flexible Elastomeric:
         1) 3/4 inch thick.
      b. Mineral-Fiber, Preformed Pipe Insulation, Type I:
         1) 3/4 inch thick.

H. Hot Service Drains:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.

I. Hot Service Vents:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.

3.11 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Domestic Water Piping:
   1. All Pipe Sizes: Insulation shall be one of the following:
      a. Flexible Elastomeric: 2 inches thick.
      b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.

B. Domestic Hot and Recirculated Hot Water:
   1. All Pipe Sizes: Insulation shall be the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.

C. Sanitary Waste Piping Where Heat Tracing Is Installed:
   1. All Pipe Sizes: Insulation shall be one of the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.

D. Hot Service Drains:
   1. All Pipe Sizes: Insulation shall be one of the following:
      a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
E. Hot Service Vents:

1. All Pipe Sizes: Insulation shall be the following:
   
a. Mineral-Fiber, Preformed Pipe Insulation, Type II: 1 inch thick.

3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. PVC:
   
a. White: 30 mils thick

3.13 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. Aluminum, Stucco Embossed: 0.016 inch thick.

3.14 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION
PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section Includes:
      1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
      2. Encasement for piping.
   B. Related Requirements:
      1. Division 22 Section "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.

1.3 SEISMIC REQUIREMENTS
   A. Seismic Performance: Pipe hangers and supports shall withstand the effects of earthquake motions determined according to SEI/ASCE 7 and with the requirements specified in Section 230548 "Vibration and Seismic Controls for HVAC."
      1. For piping with a seismic importance factor of 1.0 the term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified."
      2. For piping with a seismic importance factor of 1.5 the term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."

1.4 ACTION SUBMITTALS
   A. Product Data: For transition fittings and dielectric fittings.
   B. Delegated-Design Submittal:
      1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure.
      2. Locations of pipe anchors and alignment guides and expansion joints and loops.
3. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls.

1.5 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.
B. Field quality-control reports.

1.6 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Construction Manager or owner no fewer than two days in advance of proposed interruption of water service.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."
C. All piping shall be American made and tested; no import pipe will be permitted.
D. All exposed water supply piping in toilet rooms, custodial rooms and kitchens shall be chromium plated.
E. All piping installed in or passing through a plenum must be plenum rated, fire wrapped, or installed in a metal conduit.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L water tube, drawn temper.
B. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L water tube, annealed temper.
C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
F. Copper Unions:
1. MSS SP-123.
4. Solder-joint or threaded ends.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe:
   1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
   2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Standard-Pattern, Mechanical-Joint Fittings:
   1. AWWA C110/A21.10, ductile or gray iron.
   2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

C. Compact-Pattern, Mechanical-Joint Fittings:
   1. AWWA C153/A21.53, ductile iron.
   2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.


2.4 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:
   1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
   2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.5 TRANSITION FITTINGS

A. General Requirements:
   1. Same size as pipes to be joined.
   2. Pressure rating at least equal to pipes to be joined.
   3. End connections compatible with pipes to be joined.
B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Cascade Waterworks Manufacturing.
   b. Dresser, Inc.; Piping Specialties Products.
   c. Ford Meter Box Company, Inc. (The).
   d. JCM Industries.
   e. Romac Industries, Inc.
   f. Smith-Blair, Inc.; a Sensus company.
   g. Viking Johnson.

D. Plastic-to-Metal Transition Fittings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   b. Harvel Plastics, Inc.
   c. Spears Manufacturing Company.
2. Description:
   a. CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
   b. One end with threaded brass insert and one solvent-cement-socket or threaded end.

E. PP-to-Metal Transition Fittings:
1. Description:
   a. PP one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
   b. One end with threaded brass insert and one fusion-socket end.

F. Plastic-to-Metal Transition Unions:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Colonial Engineering, Inc.
   b. NIBCO Inc.
   c. Spears Manufacturing Company.
2. Description:
   a. CPVC four-part union.
   b. Brass threaded end.
   c. Solvent-cement-joint plastic end.
   d. Rubber O-ring.
   e. Union nut.
2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Nipples and Waterways:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Elster Perfection Corporation.
      b. Grinnell Mechanical Products; Tyco Fire Products LP.
      c. Matco-Norca.
      d. Clearflow/Perfection Corp.
      e. Precision Plumbing Products, Inc.
      f. Victaulic Company.
   3. Electroplated steel nipple or waterway complying with ASTM F 1545 or ANSI/NSF-61 Compliant.
   4. Pressure Rating and Temperature: 300 psig at 225 deg F.
   5. End Connections: Male threaded or grooved.
   6. Lining: Inert and noncorrosive, propylene or LTHS.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

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

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105/A21.5.

E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Division 22 Section "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Division 22 Section "Domestic Water Piping Specialties."

F. Install shutoff valve immediately upstream of each dielectric fitting.
G. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Division 22 Section "Domestic Water Piping Specialties."

H. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.  
1. Piping will be drained seasonally for freeze protection.

I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

J. Install seismic restraints on piping. Comply with SEI/ASCE 7 and with requirements for seismic-restraint devices in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

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

L. 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.

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

N. Install piping to permit valve servicing.

O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

P. Install piping free of sags and bends.

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

R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

S. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Division 22 Section "Meters and Gages for Plumbing Piping."

T. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Division 22 Section "Domestic Water Pumps."

U. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Division 22 Section "Meters and Gages for Plumbing Piping."

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

W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. 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.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:
   1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
   2. Fittings for NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples/waterways.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric nipples/waterways.
D. Dielectric Fittings for NPS 5 and Larger: Use dielectric nipples/waterways.

3.6 HANGER AND SUPPORT INSTALLATION

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

B. Comply with requirements for pipe hanger, support products, and installation in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls.
   Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

   1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
   2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
   3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
   4. NPS 2-1/2: 108 inches with 1/2-inch rod.
   5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
   6. NPS 6: 10 feet with 5/8-inch rod.
   7. NPS 8: 10 feet with 3/4-inch rod.

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

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

   1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
   2. NPS 1-1/2: 108 inches with 3/8-inch rod.
   3. NPS 2: 10 feet with 3/8-inch rod.
   4. NPS 2-1/2: 11 feet with 1/2-inch rod.
   5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
   6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
   7. NPS 6: 12 feet with 3/4-inch rod.
   8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.

H. Install supports for vertical steel piping every 15 feet.

I. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.
### 3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code. Comply with requirements for connection sizes in Division 22 plumbing fixture Sections.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

### 3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Division 22 Section "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

### 3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:
   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
2. Piping Tests:
   a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:
   1. Close drain valves, hydrants, and hose bibbs.
   2. Open shutoff valves to fully open position.
   3. Open throttling valves to proper setting.
   4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
      a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
      b. Adjust calibrated balancing valves to flows indicated.
   5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
   7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
   8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:
   1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
   2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.

2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

d. Repeat procedures if biological examination shows contamination.

e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.

2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

A. Some piping types and sizes mentioned in this section may not be used on this project.

B. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

C. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

D. All exposed water supply piping in toilet rooms, custodial rooms and kitchens shall be chromium plated.

E. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller, shall be the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.

F. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 and larger, shall be the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
G. Under-building-slab, combined domestic water, building-service, and fire-service-main piping, NPS 6 to NPS 12, shall be the following:
   1. Mechanical-joint, ductile-iron pipe; standard, mechanical-joint fittings; and mechanical joints.

H. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be the following:
   1. Hard copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.

I. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
   1. Hard copper tube, ASTM B 88, Type L; cast- copper, solder-joint fittings; and soldered joints.

J. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be the following:
   1. Hard copper tube, ASTM B 88, Type L; cast- copper, solder-joint fittings; and soldered joints.

K. Aboveground domestic water piping, NPS 5 and larger, shall be the following:
   1. Hard copper tube, ASTM B 88, Type L; cast- copper, solder-joint fittings; and soldered joints.

3.13 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
   1. Shutoff Duty: Use ball for piping NPS 3 and smaller. Use butterfly or ball, with flanged ends for piping NPS 4 and larger.
   2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

END OF SECTION
SECTION 22 1316
SANITARY WASTE AND VENT PIPING

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. Pipe, tube, and fittings.
   2. Specialty pipe fittings.

1.3 DEFINITIONS
A. EPDM: Ethylene-propylene-diene terpolymer rubber.
B. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS
A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to SEI/ASCE 7 and with the requirements specified in Section 230548 "Vibration and Seismic Controls for HVAC."
   1. For piping with a seismic importance factor of 1.0 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."
   2. For piping with a seismic importance factor of 1.5 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 and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.


1.8 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
   1. Notify Construction Manager no fewer than two days in advance of proposed interruption of sanitary waste service.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: All cast-iron waste, vent and sewer pipe and fittings shall conform to the requirements of CISPI Standard 301 and ASTM A 888. All products shall be marked with the collective trademark of the Cast Soil Pipe Institute and shall be listed by NSF International or receive prior approval of the engineer. All cast-iron pipe and fittings shall be American made and tested. Non-compliant import cast-iron products will not be permitted. Any non-compliant cast-iron product installed by the contractor on this project will be replaced at the contractor’s expense and shall include all repairs, patching, painting and other incidental work required to return the project to its pre- remediation state.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. CISPI, Hubless-Piping Couplings:
   
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      
      a. ANACO.
      b. Ideal
      c. Mission Rubber Company; a division of MCP Industries, Inc.
      d. Tyler Pipe.
   
   3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
   4. Listing: Couplings shall be listed by NSF International. Each coupling shall be embossed with the NSF seal.

C. Heavy-Duty, Hubless-Piping Couplings:
   
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      
      a. Husky SD 4000.
      b. Clamp-All Corp HI-TORQ 125.
   
   3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.
   
   1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services’ "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solvent Cement: ASTM D 2564.
   
   1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Division 31 Section “Earth Moving.”

3.2 PIPING INSTALLATION

A. 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.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. 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.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

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

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with SEI/ASCE 7 and with requirements for seismic-restraint devices specified in Division 22 Section “Vibration and Seismic Controls for Plumbing Piping and Equipment.”

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer’s written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Install underground PVC piping according to ASTM D 2321.

P. Install engineered soil and waste drainage and vent piping systems as follows:


Q. Plumbing Specialties:

1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Division 22 Section "Sanitary Waste Piping Specialties."
2. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Division 22 Section "Sanitary Waste Piping Specialties."
3. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.

R. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

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

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

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

3.3 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

B. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 HANGER AND SUPPORT INSTALLATION

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

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

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:
   a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support horizontal piping and tubing within 12 inches of each fitting and coupling or valve and coupling.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

   1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
   2. NPS 3: 60 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
   4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
   5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
   6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.
B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:
   1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
   2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
   3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
   4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
   5. Comply with requirements for cleanouts and drains specified in Division 22 Section "Sanitary Waste Piping Specialties."
   6. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make fixture and equipment 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.

3.6 IDENTIFICATION
A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL
A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
   1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 3 and smaller shall be the following:
   1. Hubless, cast-iron soil pipe and fittings CISPI hubless-piping couplings; and coupled joints.

C. Aboveground, soil and waste piping NPS 4 and larger shall be the following:
   1. Hubless, cast-iron soil pipe and fittings heavy-duty hubless-piping couplings; and coupled joints.

D. Aboveground, vent piping NPS 3 and smaller shall be the following:
   1. Hubless, cast-iron soil pipe and fittings CISPI hubless-piping couplings; and coupled joints.
E. Aboveground, vent piping NPS 4 and larger shall be the following:

1. Hubless, cast-iron soil pipe and fittings CISPI hubless-piping couplings; and coupled joints.

F. Underground, soil, waste, and vent piping NPS 3 and smaller shall be any of the following:

1. Hubless, cast-iron soil pipe and fittings CISPI hubless-piping couplings; and coupled joints.
2. Di
t


G. Underground, soil and waste piping NPS 4 and larger shall be any of the following:

1. Hubless, cast-iron soil pipe and fittings heavy-duty hubless-piping couplings; and coupled joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

END OF SECTION
SECTION 22 4200
PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. All pertinent sections of Division 23, Mechanical General Requirements are a part of the work described in this section. Division 1 is a part of this and all other sections of these specifications.

1.2 SCOPE OF WORK:

A. This work shall include all plumbing fixtures required for the complete plumbing system.

B. A complete rainwater system.

C. All electrical wiring not specified in other sections but required for a complete operation system, shall be work of this section.

1.3 CODES AND STANDARDS:

A. All work included in the scope of this specification shall conform to the latest adopted versions of applicable codes and standards, including the following:

   International Plumbing Code (IPC)
   International Building Code

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

   1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.


F. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

G. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

H. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

2. Brass and Copper Supplies: ASME A112.18.1M.
6. Tubular Brass Drainage Fittings and Piping: ASME A112.18.1M.

I. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Floor Drains: ASME A112.21.1M.
2. Grab Bars: ASTM F 446.
5. Off-Floor Fixture Supports: ASME A112.6.1M.

1.5 SUBMITTALS:

A. Submit product data in accordance with Division 1 and Section 230550. Submit the following:

- Piping
- Valves
- Plumbing Fixtures and Accessories
- Water Hammer Arrestors
- Pressure Reducing Valves
- Reduced Pressure Backflow Preventors
- Sterilization Contractor

1.6 TESTS:

A. Defective Work: If inspection or tests show defects, such defective work or material shall be replaced or corrected and inspection and tests shall be repeated. All repairs to piping shall be made with new materials. No caulking or screwed joints or holes will be acceptable.

B. All defects in material and workmanship which appear during the test shall be promptly remedied and the test shall be reapplied.

C. Enclosed Piping: Any piping which is to be insulated, placed within the construction, or otherwise concealed shall be carefully tested before being permanently enclosed.

D. Test Instruments: All testing shall be performed in the presence of the Architect and his Mechanical Engineer and shall meet with their approval. Instruments required for making the tests shall be provided by this Contractor. Relief valves set to avoid excessive pressure during testing shall be provided.
E. **Required Adjustments:** Before final acceptance of the piping system as a whole, this Contractor shall make all required adjustments, including controls, flush valves, etc., and shall place the entire piping system in a perfect operating condition. At the completion of the work, this Contractor shall furnish the Architect with all certificates of inspection.

### 1.7 GENERAL REQUIREMENTS:

**A. Existing Lines:**

1. Any utility line uncovered during construction that is not clearly defined on the drawings shall be immediately brought to the attention of the Architect and Owner. The Owner and Architect will subsequently inform the Contractor what should be done. A change order shall be initiated in accordance with the General Conditions for such occurrences. Relocation of any existing piping shall be done with the same material and fittings as the original installation. Damaged or removed insulation shall be repaired and/or replaced.

**B. Vents:**

1. The entire system shall be properly vented to atmosphere and all gases shall be discharged at points not less than 14 inches above the roof line. Each fixture shall be back-vented on the discharge side of the safe water seal and arranged for free passage of all gases to atmosphere. Vent lines are to be offset, if necessary, so that they will not pierce the roof at points closer than 5 feet 0 inches from the edge of the roof, except where shown otherwise on the drawings.

**C. Cleanouts:**

1. Full size cleanouts shall be installed at the base of each soil waste or rainwater stack and at the end of each horizontal run of sanitary piping. All other cleanouts shall be installed where shown on the drawings and where required by State, local, or National Plumbing Codes.

2. Cleanouts shall have cast-iron bodies with threaded brass screw plugs. They shall be the full size of the pipe line in which they are installed, up to and including 4 inches. All cleanouts shall be installed in locations easily accessible for rodding. Where stacks or other piping is concealed, cleanouts shall be installed above the floor with extensions made to the finished wall surface. Cleanouts in walls shall be J. R. Smith 4402 with countersunk plugs and round stainless steel access covers. In floors, J. R. Smith 4023 square top cleanouts with countersunk plugs and round scioriated polished nickel bronze access covers with frames shall be used.

3. Cleanouts shall be J. R. Smith, Zurn, Wade, or Josam. J. R. Smith references are used herein.

4. The cleanouts bodies provided in finished floors shall be of the type which allows flooring to be added, i.e. Carpet, Tile or Wood to fit within the manufactured ring and still be flush with the floor.

**D. Traps:**

1. Each fixture and appliance installed in the work and discharging water into the sewer or house drainage system shall have a seal trap arranged in connection with a complete venting system and shall be installed so that all gases shall pass freely to the atmosphere with no pressure or siphon condition on the water seal. Each fixture shall have a water seal of not less than (2) inches and not more than (4) inches except where a deeper seal is found necessary by the Administrative Authority for special conditions. Fixtures connected to acid waste piping shall be acid waste type.

**E. Flashing and Sleeves:**
1. Furnish and install on each pipe passing through the roof a Stoneman Stormtite four pound seamless lead flashing assembly extending horizontally not less than 12-inches all around. Flashing to have steel reinforced conical boot and counter-flashed with a hooded cast iron counter-flashing. Seal the neck of the flashing to the pipe with permaseal waterproofing compound and secure the counter-flashing to the pipe with vandal proof screws. Fill the top annular space of counter-flashing with epoxy compound. Alternate using open top models of all pipes. See specification Section 230100.

2. Sleeves for pipes passing through walls, floors or ceilings shall be as specified in Section 220501.

F. Roof, Floor and Cleanout Pans:

1. Roof drains, floor drains and cleanouts shall have 4-pound lead sheet pans 30 inches square or as noted. Roof flashing members shall be placed into position but the final installation shall be made by the Roofer under supervision of this section. Floor drains with clamping collars shall be complete with pan. Provide code approved pans for showers.

G. Courses of Water Pipes:

1. Water pipes shall not be exposed in finished rooms except where noted on plans or as permitted by the Architect, except the finished brass supplies that are a part of the fixture trimmings. Pipes are to be run in tunnel, furred ceiling and walls, and behind or under cabinets as shown.

H. Sewer Location:

1. Where the location of the sewer is not clearly defined by dimension on the drawings, it shall not be closer than 10 feet horizontally to a water main or service line, except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, where they shall cross each other at neat 90-degree angles. Verification of existing sewer main elevations shall be made prior to connection or installation of any new lines. Should installation at the minimum required slope be attainable at the connection points shown, the Architect shall be immediately notified before installation of the line possible.

I. Piping Layouts:

1. Layout of piping shown on drawings is in a general sense diagrammatic as to the exact location of piping. It is to be understood by the Contractor that unforeseen conditions and obstacles at the site may not permit the running of piping as scaled from the drawings, but changes shall not be made without the written permission of the Architect. The Plumbing Contractor shall check toilet room details as shown on the Architectural drawings. He shall check the grade of a waste line with a transit before installing the pipe.

2. See the Plumbing Fixture Schedule and Lab Equipment Schedule on plans for the sizing of connecting lines to each fixture.

J. Floor Drains:

1. Exposed surfaces of floor drains, unless otherwise noted, shall be finished in nickel bronze. Floor waterproofing materials shall be securely anchored in the clamping ring of the floor drain. Floor drain strainers in ceramic tile floors shall be square. The tops of all drains shall be set flush with the finished floor level except where floors are warped to drains, where these shall be set flush. The Contractor shall consult with the trades responsible for adjacent work before establishing final finish elevations. Openings shall be core drilled.
K. Waste and Vent System:

1. A complete plumbing waste and vent system shall be furnished and installed for soil and acid waste. It shall be installed in strict compliance with the International Plumbing Code. It shall be incorporated into the space constraints in the building.

L. Connections to Equipment:

1. The Plumbing Contractor shall rough in all utility lines to the cabinets, tables, hoods, and terminate utilities with shutoff valve and waste and vent lines with caps. All such rough-ins shall be labeled. Plumbing contractor shall supply all stops and supply tubing, as well as P-traps to complete the installation. Final connections to be by the Plumbing Contractor.

2. The cabinet supplier shall provide complete roughing in drawings showing the exact location of all stub-ups in floors and walls. It shall be the responsibility of the Plumbing Contractor to install all sleeves through walls and floors and to make all final connections. Piping through floors shall be sleeved, caulked, and flashed water tight to prevent leakage should a leak occur.

1.8 EQUIPMENT AND INSTALLATION:

A. Backflow Preventers:

1. Reduced pressure principle assemblies shall be tested, approved and listed by the Foundation for Cross-Connection Control and Hydraulic Research. Backflow Preventers shall be Watts, or Febco.

2. Backflow preventers shall be located no more than 4 feet above finished floor, or as required to allow for maintenance and testing. Provide adequate floor supports so that no undue strain is placed upon connected piping.

B. Vacuum Breakers:

1. All water outlets with hose ends where backflow is possible and where required by code shall be complete with vacuum breakers. Where vacuum breaker is not specified with fixture trim, the breaker shall be installed in the supply line to the fixture. Vacuum breakers in the supply line shall be Pressure Vacuum breaker by Watts.

2. Atmospheric vacuum breakers shall be of chrome-plated brass, or specified finish, and shall be FEBCO or Watts. Vacuum breaker shall be in accordance with American society of Sanitary Engineers (ASSE) Standard 1011 and shall be capable of being drained if located where freezing is possible.

3. Pressure type vacuum breakers shall be Febco or Watts.

C. Access Panels:

1. Access panels shall be installed over all concealed valves, cleanout, and any other concealed equipment that may require access for operation, maintenance, and repair. Access box locations shall be verified with the Architect prior to installation.

Tile Walls: J.R. Smith, Zurn, Wad, Josam or Watts, chrome plated
Ceilings: J.R. Smith, Zurn, Wade, Josam or Watts, bonderized and primed.
STERILIZATION:

D. After the entire system is completed and tested for pressure, and just before the building is ready to be occupied, this Contractor shall sterilize the system as follows: After the mains are flushed, a water and chlorine solution concentrated to 250 ppm shall be introduced. The treated water and chlorine solution shall be retained for not less than 24 hours. All valves, faucets, etc. shall be opened and closed during this time before final flushing out of the system. Flush system with clean water until the chlorine content is less than 0.2 PPM. The water system will not be accepted until a negative bacteriological test is made on water taken from the systems.

1.9 COORDINATION

A. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 - PRODUCTS:

2.1 MANUFACTURERS

A. List of manufacturers and their products or manufacturers only, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in other Part 2 articles.
2. Products: Subject to compliance with requirements, provide one of the products specified in other Part 2 articles.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified in other Part 2 articles.
4. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified in other Part 2 articles.

2.2 PLUMBING FIXTURES:

A. This Contractor shall furnish and install all fixtures shown on the drawings or specified hereinafter, shall make all parts complete, and shall leave the entire system in perfect working order. He shall clean and adjust all fixtures before leaving the job. Any damaged or cracked fixtures shall be replaced at the Contractor's expense.

B. The fixtures shall be all new and complete as shown or described in catalog or as required for the work. The fixtures shall include accessible loose key compression stops above the floor in supplies to all fixtures and cast brass P-traps unless otherwise shown. Trim for all fixtures shall be chrome plated and all trim shall match in design. All exposed piping in occupied spaces shall be chrome plated. Supply faucets shall have renewable seats and barrels.

C. Floor drains and floor sinks shall be furnished with clamping collars where a waterproof membrane is provided. Membranes will be required for all drains installed above occupied spaces. See architectural drawings for additional locations of membranes. Use 40 mil pvc liner or 4# lead.
2.3 FIXTURE SCHEDULE

A. Products:

1. Sink S1: Lavatory Kohler K2030, Greenwich, 20” x 18”, vitreous china with front overflow, 4” centers. Kohler K-8998 P-Trap with clean out plug.

2. Faucet: Chicago Faucets No. 786-GN2FCABCP, Sink Faucet for hot and cold water, concealed deck-mount with 8” fixed center and 4” wristblade handles, chrome plated. Rigid / swing gooseneck spout, 5¼” center-to-center with 1.5 GPM laminar flow control.

END OF SECTION
SECTION 22 6113

COMPRESSED-AIR PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Medical compressed-air piping, designated "medical air."
2. Gas-powered-tool compressed-air piping, designated "instrument air."
3. Healthcare laboratory compressed-air piping, designated "instrument air."

B. Related Requirements:

1. Section 115313 "Laboratory Fume Hoods" for compressed-air outlets in laboratory fume hoods.
2. Section 123553 "Laboratory Casework" for compressed-air outlets in laboratory casework.
3. Section 123570 "Healthcare Casework" for compressed-air outlets in healthcare casework.
4. Section 226119 "Compressed-Air Equipment for Laboratory and Healthcare Facilities" for air compressors and specialties.
5. Section 226400 "Medical Gas Alarms" for combined medical air, vacuum, and gas alarms.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Seismic Qualification Certificates: For medical compressed-air manifolds, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Material Certificates: Signed by Installer certifying that medical compressed-air piping materials comply with requirements in NFPA 99 for positive-pressure medical gas systems.

D. Brazing certificates.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For compressed-air piping specialties to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quick-Coupler Service Connections: Furnish complete noninterchangeable medical compressed-air pressure outlets.
   a. Medical Air: Equal to 10 percent of amount installed.
   b. Instrument Air: Equal to 10 percent of amount installed.

   a. Medical Air D.I.S.S. No. 1160: Equal to 10 percent of amount installed, but no fewer than 10 units.
   b. Instrument Air D.I.S.S. No. 1160: Equal to 10 percent of amount installed, but no fewer than 10 units.

1.8 QUALITY ASSURANCE

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

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

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

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Medical air operating at 50 to 55 psig.

B. Instrument air operating at 175 psig.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Medical compressed-air manifolds shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and with the requirements specified in Section 220548 Vibration and Seismic Controls for Plumbing Piping and Equipment.

1. The term "withstand" means "the manifold will remain in place without separation of any parts when subjected to the seismic forces specified and the manifold will be fully operational after the seismic event."

2. Component Importance Factor is 1.5.

2.3 PIPES, TUBES, AND FITTINGS

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

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

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

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

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

F. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.


2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.

G. Shape-Memory-Metal Couplings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

   a. Aerofit, Inc.
   b. Smart Tap, Inc.

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

H. Flexible Pipe Connectors:

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

2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

   a. Flex-Hose Co., Inc.
   b. Flexicraft Industries.
   c. Hyspan Precision Products, Inc.
   d. Mercer Gasket & Shim, Inc.
   e. Metraflex Company (The).
   f. Proco Products, Inc.
   g. Unaflex.
   h. Universal Metal Hose; a Hyspan Co.

3. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

   a. Working-Pressure Rating: 200 psig minimum.
   b. End Connections: Plain-end copper tube.

### 2.4 JOINING MATERIALS

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

B. Threaded-Joint Tape: PTFE.

### 2.5 VALVES

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

B. Zone-Valve Box Assemblies: Box with medical gas valves, tube extensions, and gages.

1. Zone-Valve Boxes:

   a. Steel Box with Aluminum Cover:

      1) Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2) Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

   a) Allied Healthcare Products Inc.
   b) Amico Corporation.
   c) Ohio Medical Corporation.
   d) BeaconMedaes

b. Description: Formed steel box with cover, anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves. Medical air and medical vacuum tubing, valves, and gages may be incorporated in zone valve boxes for medical gases.

1) Interior Finish: Factory-applied white enamel.
2) Cover Plate: Aluminum with frangible or removable windows.
3) Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

C. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

   a. Allied Healthcare Products Inc.; Chemetron Division.
   b. Amico Corporation.
   c. BeaconMedaes.
   d. Conbraco Industries, Inc.
   e. Marwin Valve; a division of Richards Industries.
   f. NIBCO INC.
   g. Ohio Medical Corporation.
   h. Tri-Tech Medical Inc.

4. Description: Three-piece body, brass or bronze.
5. Pressure Rating: 300 psig minimum.
7. Seats: PTFE or TFE.
8. Handle: Lever type with locking device.
9. Stem: Blowout proof with PTFE or TFE seal.

D. Check Valves:

1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:

   a. Allied Healthcare Products Inc.; Chemetron Division.
   b. Amico Corporation.
   c. BeaconMedaes.
   d. Conbraco Industries, Inc.
e. Ohio Medical Corporation.
f. Tri-Tech Medical Inc.

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

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

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

2.6 MEDICAL COMPRESSED-AIR SERVICE CONNECTIONS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide Chemetron compatible outlets by one of the following:

1. Allied Healthcare Products Inc.; Chemetron Division.
2. Amico Corporation.
4. Ohio Medical Corporation.
5. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
6. Tri-Tech Medical Inc.

C. General Requirements for Medical Compressed-Air Service Connections:

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

D. Roughing-in Assembly:

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

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

G. D.I.S.S. Pressure Service Connections: Outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.

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

2.7 MEDICAL COMPRESSED-AIR PRESSURE CONTROL PANELS

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

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

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

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:

1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
2. Wash medical gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.
   a. Scrub to ensure complete cleaning.
   b. Rinse with clean, hot water to remove cleaning solution.

3.2 PIPING INSTALLATION

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

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

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

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

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

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

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

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

I. Install eccentric reducers, if available, where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.
J. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver. Comply with requirements in Section 220519 "Meters and Gauges for Plumbing Piping."

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

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

O. Install medical air piping to medical air service connections specified in this Section, to medical air service connections in equipment specified in Section 226313 "Gas Piping for Laboratory and Healthcare Facilities," and to equipment specified in other Sections requiring medical air service.

P. Piping Restraint Installation: Install seismic restraints on compressed-air piping. Seismic-restraint devices are specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

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

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

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

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 VALVE INSTALLATION

A. Install shutoff valve at each connection to and from compressed-air equipment and specialties.

B. Install check valves to maintain correct direction of compressed-air flow from compressed-air equipment.

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

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

E. Install pressure regulators on compressed-air piping where reduced pressure is required.

F. Install flexible pipe connectors in discharge piping and in inlet air piping from remote air-inlet filter of each air compressor.
3.4 **JOINT CONSTRUCTION**

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

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

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

D. Flanged Joints: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.

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

3.5 **COMPRESSED-AIR SERVICE COMPONENT INSTALLATION**

A. Install compressed-air pressure control panel in walls. Attach to substrate.

3.6 **HANGER AND SUPPORT INSTALLATION**

A. Comply with requirements in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

B. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

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

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

E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

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

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

H. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch- minimum rods.

I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1/4: 60 inches with 3/8-inch rod.
   2. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
   4. NPS 1: 96 inches with 3/8-inch rod.
6. NPS 1-1/2: 10 feet with 3/8-inch rod.
7. NPS 2: 11 feet with 3/8-inch rod.
8. NPS 2-1/2: 13 feet with 1/2-inch rod.
9. NPS 3: 14 feet with 1/2-inch rod.
10. NPS 3-1/2: 15 feet with 1/2-inch rod.
11. NPS 4: 16 feet with 1/2-inch rod.

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

3.7 IDENTIFICATION

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

1. Medical Air: Black letters on yellow background.
2. Instrument Air: White letters on red background.
3. Medical Laboratory Air: Black letters on yellow-and-white checkerboard background.

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

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

B. Tests and Inspections:

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

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

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

i. Operational pressure test.

j. Medical air purity test.

k. Verify correct labeling of equipment and components.

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

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

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

3.9 PROTECTION

A. Protect tubing from damage.

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

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

3.10 PIPING SCHEDULE

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

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

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

3.11 VALVE SCHEDULE

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

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

END OF SECTION 22 6113
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

   1. Medical-surgical vacuum piping, designated "medical vacuum."
   2. Waste anesthetic gas disposal piping, designated "WAGD."

B. Related Requirements:

   1. Section 115313 "Laboratory Fume Hoods" for vacuum inlets in laboratory fume hoods.
   2. Section 123553 "Laboratory Casework" for vacuum inlets in laboratory casework.
   3. Section 123570 "Healthcare Casework" for vacuum inlets in healthcare casework.
   4. Section 226219 "Vacuum Equipment for Laboratory and Healthcare Facilities" for vacuum producers and accessories.
   5. Section 226400 "Medical Gas Alarms" for vacuum piping alarms.

1.3 DEFINITIONS

A. WAGD: Waste anesthetic gas disposal.

B. Medical vacuum piping systems include medical vacuum, WAGD, dental vacuum, HVE, and medical laboratory vacuum piping systems.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Material Certificates: Signed by Installer certifying that medical vacuum piping materials comply with requirements in NFPA 99.

C. Brazing certificates.

D. Field quality-control reports.
1.6 CLOSEOUT SUBMITTALS

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

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quick-Coupler Service Connections: Furnish complete noninterchangeable medical vacuum suction inlets.
   a. Medical Vacuum: Equal to 10 percent of amount installed, but no fewer than 10 units.
   b. WAGD: Equal to 10 percent of amount installed, but no fewer than 10 units.

   a. Medical Vacuum D.I.S.S. No. 1220: Equal to 10 percent of amount installed, but no fewer than 10 units.
   b. WAGD D.I.S.S. No. 2220: Equal to 10 percent of amount installed, but no fewer than 10 units.

1.8 QUALITY ASSURANCE

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

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

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

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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

2.2 PIPES, TUBES, AND FITTINGS

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

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

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

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

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

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

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

2.3 JOINING MATERIALS

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

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

C. Threaded-Joint Tape: PTFE.

2.4 VALVES

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

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

C. Copper-Alloy Ball Valves:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
   a. Allied Healthcare Products Inc.; Chemetron Division.
   b. Amico Corporation.
   c. BeaconMedaes.
   d. Conbraco Industries, Inc.
   e. Marwin Valve; a division of Richards Industries.
   f. NIBCO INC.
   g. Ohio Medical Corporation.
   h. Tri-Tech Medical Inc.

4. Description: Three-piece body, brass or bronze.
5. Pressure Rating: 300 psig minimum.
7. Seats: PTFE or TFE.
8. Handle: Lever type with locking device.
9. Stem: Blowout proof with PTFE or TFE seal.
10. Ends: manufacturer-installed ASTM B 819, copper-tube extensions with pressure gage on one copper-tube extension.

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

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

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

C. General Requirements for Medical Vacuum Service Connections:

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

D. Roughing-in Assembly:

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

E. Finishing Assembly:

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

F. Quick-Coupler Suction Service Connections:

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

G. D.I.S.S. Suction Service Connections:

1. Inlets complying with CGA V-5.
2. Threaded indexing to prevent interchange between services.
3. Constructed to permit one-handed connection and removal of equipment.

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

I. Cover Plates:

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

2.6 NITROGEN

A. Comply with USP 32 - NF 27 for oil-free dry nitrogen.
PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:

1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
2. Wash medical gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.
   a. Scrub to ensure complete cleaning.
   b. Rinse with clean, hot water to remove cleaning solution.

3.2 PIPING INSTALLATION

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

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

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

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

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

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

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

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

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

J. Provide drain leg and drain trap at end of each main and branch and at low points.
K. Install thermometer and vacuum gage on inlet piping to each vacuum producer and on each receiver and separator. Comply with requirements in Section 220519 "Meters and Gages for Plumbing Piping."

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

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

O. Install medical vacuum piping from medical vacuum service connections specified in this Section, to equipment specified in Section 226219 "Vacuum Equipment for Laboratory and Healthcare Facilities," and to equipment specified in other Sections requiring medical vacuum service.

P. Piping Restraint Installation: Install seismic restraints on vacuum piping. Seismic-restraint devices are specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

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

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

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

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

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 VALVE INSTALLATION

A. Install shutoff valve at each connection to and from vacuum equipment and specialties.

B. Install check valves to maintain correct direction of vacuum flow to vacuum-producing equipment.

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

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

E. Install flexible pipe connectors in suction inlet piping to each vacuum producer.
3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

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

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

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

E. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Do not use flux. Continuously purge joint with oil-free dry nitrogen during brazing.

F. Flanged Joints:
   1. Copper Tubing: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.
   2. PVC Piping: Install PVC flange on PVC pipes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.

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

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

B. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

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

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

E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

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

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

H. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1/4: 60 inches with 3/8-inch rod.
2. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
4. NPS 1: 96 inches with 3/8-inch rod.
6. NPS 1-1/2: 10 feet with 3/8-inch rod.
7. NPS 2: 11 feet with 3/8-inch rod.
8. NPS 2-1/2: 13 feet with 1/2-inch rod.
9. NPS 3: 14 feet with 1/2-inch rod.
10. NPS 3-1/2: 15 feet with 1/2-inch rod.
11. NPS 4: 16 feet with 1/2-inch rod.
12. NPS 6: 20 feet with 5/8-inch rod.

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

3.6 IDENTIFICATION

A. Install identifying labels and devices for laboratory vacuum piping, valves, and specialties. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment."

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

1. Medical Vacuum: Black letters on white background.
2. WAGD: White letters on violet background.

3.7 FIELD QUALITY CONTROL FOR HEALTHCARE FACILITY MEDICAL VACUUM PIPING

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

B. Tests and Inspections:

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

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

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

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

   a. Standing pressure test.
   b. Individual-pressurization or pressure-differential cross-connection test.
c. Valve test.
d. Master and area alarm tests.
e. Piping purge test.
f. Final tie-in test.
g. Operational vacuum test.
h. Verify correct labeling of equipment and components.

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

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

### 3.8 FIELD QUALITY CONTROL FOR LABORATORY FACILITY NONMEDICAL VACUUM PIPING

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

#### B. Tests and Inspections:

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

2. Repair leaks and retest until no leaks exist.
3. Inspect filters for proper operation.

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

### 3.9 PROTECTION

#### A. Protect tubing from damage.

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

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

### 3.10 PIPING SCHEDULE

#### A. Connect new copper tubing to existing copper tubing with memory-metal couplings.
B. Flanges may be used where connection to flanged equipment is required.

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

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

3.11 VALVE SCHEDULE

A. Shutoff Valves:

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

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

END OF SECTION 22 6213
SECTION 22 6313

GAS PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Carbon dioxide piping, designated "medical carbon dioxide."
2. Nitrogen piping, designated "medical nitrogen."
3. Nitrous oxide piping, designated "medical nitrous oxide."
4. Oxygen piping, designated "medical oxygen."

B. Owner-Furnished Material:

1. Medical gas manifolds.

C. Related Requirements:

1. Section 115313 "Laboratory Fume Hoods" for gas outlets in laboratory fume hoods.
2. Section 123553 "Laboratory Casework" for gas outlets in casework.
4. Section 226400 "Medical Gas Alarms" for combined medical air, vacuum, and gas alarms.

1.3 DEFINITIONS

A. CR: Chlorosulfonated polyethylene synthetic rubber.

B. Medical gas piping systems include medical carbon dioxide, medical nitrogen, medical nitrous oxide, and medical oxygen for healthcare facility patient care.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.
B. Seismic Qualification Certificates: For gas manifolds and bulk gas storage tanks, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Material Certificates: Signed by Installer certifying that medical gas piping materials comply with requirements in NFPA 99 for positive-pressure medical gas systems.

D. Brazing certificates.

E. Certificates of Shop Inspection and Data Report for Bulk Gas Storage Tanks: As required by ASME Boiler and Pressure Vessel Code.

F. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

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

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quick-Coupler Service Connections: Furnish complete noninterchangeable medical gas pressure outlets and suction inlets.

a. Medical Carbon Dioxide: Equal to 10 percent of quantity installed, but no fewer than 10 units.

b. Medical Nitrous Oxide: Equal to 10 percent of quantity installed, but no fewer than 10 units.


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

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

3. Shape-Memory-Metal Coupling Joints: An authorized representative who is trained and approved by manufacturer.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the medical gas piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.

1. Qualify testing personnel according to ASSE Standard #6020 for medical-gas-system inspectors and ASSE Standard #6030 for medical-gas-system verifiers.


PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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

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

2.3 PIPES, TUBES, AND FITTINGS

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

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

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

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

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

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

2.4 JOINING MATERIALS

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

B. Threaded-Joint Tape: PTFE.

2.5 VALVES

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

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

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

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

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

E. Emergency Oxygen Connections: Low-pressure oxygen inlet assembly for connection to building oxygen piping systems.

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

3. Enclosure: Weatherproof hinged locking cover with caption similar to "Emergency Low-Pressure Gaseous Oxygen Inlet."
4. Inlet: Manufacturer-installed, NPS 1 or NPS 1-1/4, ASTM B 819, copper tubing with NPS 1 minimum ball valve.
5. Safety Valve: Bronze-body pressure relief valve set at 75 or 80 psig.
6. Instrumentation: Pressure gage.

F. Safety Valves:

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

G. Pressure Regulators:

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

### 2.6 MEDICAL GAS SERVICE CONNECTIONS

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

**B. Basis-of-Design Product:** Subject to compliance with requirements, provide Chemetron Compatible product by one of the following:

1. Allied Healthcare Products Inc.; Chemetron Division.
2. Amico Corporation.
4. Ohio Medical Corporation.
5. Oxequip Health Industries; a division of Allied Healthcare Products Inc.
6. Tri-Tech Medical Inc.

**C. General Requirements for Medical Gas Service Connections:**

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

**D. Roughing-in Assembly:**

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

**E. Finishing Assembly:**

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

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

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

I. D.I.S.S. Pressure Service Connections: Outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.

1. Medical Carbon Dioxide: D.I.S.S. No. 1080.

J. D.I.S.S. Pressure Service Connections: Outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.


K. D.I.S.S. Suction Service Connections: Inlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.

2. WAGD: D.I.S.S. No. 2220.

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

2.7 NITROGEN

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:

1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
2. Wash medical gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.

   a. Scrub to ensure complete cleaning.
3.2 PIPING INSTALLATION

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

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

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

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

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

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

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

H. Install piping to permit valve servicing.

I. Install piping free of sags and bends.

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

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

L. Piping Restraint Installation: Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

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

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

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

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 VALVE INSTALLATION

A. Install shutoff valve at each connection to gas laboratory and healthcare equipment and specialties.

B. Install check valves to maintain correct direction of gas flow from laboratory and healthcare gas supplies.

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

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

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

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

3.4 JOINT CONSTRUCTION

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

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

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

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

3.5 GAS SERVICE COMPONENT INSTALLATION

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

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

C. Install gas manifolds anchored to substrate.

D. Install gas cylinders and connect to manifold piping.
E. Install gas manifolds with seismic restraints.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

B. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

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

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

E. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls.
   Support pipe rolls on trapeze. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

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

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

H. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1/4: 60 inches with 3/8-inch rod.
   2. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
   4. NPS 1: 96 inches with 3/8-inch rod.
   6. NPS 1-1/2: 10 feet with 3/8-inch rod.
   7. NPS 2: 11 feet with 3/8-inch rod.
   8. NPS 2-1/2: 13 feet with 1/2-inch rod.
   9. NPS 3: 14 feet with 1/2-inch rod.
  10. NPS 3-1/2: 15 feet with 1/2-inch rod.
  11. NPS 4: 16 feet with 1/2-inch rod.
  12. NPS 6: 20 feet with 5/8-inch rod.

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

3.7 IDENTIFICATION

A. Install identifying labels and devices for specialty gas piping, valves, and specialties. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Install identifying labels and devices for healthcare medical gas piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:
1. Carbon Dioxide: Black or white letters on gray background.
4. Oxygen: White letters on green background or green letters on white background.

3.8 FIELD QUALITY CONTROL FOR HEALTHCARE FACILITY MEDICAL GAS

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

B. Tests and Inspections:

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

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

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

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

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

D. Prepare test and inspection reports.
3.9 FIELD QUALITY CONTROL FOR LABORATORY FACILITY SPECIALTY GAS

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

B. Tests and Inspections:

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

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

D. Prepare test and inspection reports.

3.10 PROTECTION

A. Protect tubing from damage.

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

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

3.11 DEMONSTRATION

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

3.12 PIPING SCHEDULE

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

3.13 VALVE SCHEDULE

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

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

END OF SECTION 22 6313
DIVISION 26 - ELECTRICAL

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SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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. Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:
   1. Section 26 05 33 “Raceways and Boxes for Electrical Systems”
   2. Section 26 09 23 “Lighting Control Devices”
   3. Section 26 09 36 “Standalone Modular Preset Dimming Controls”
   4. Section 26 09 43 “Relay-Based Lighting Controls”
   5. Section 27 41 33 “Master Antenna Television System”
   6. Section 27 51 17 “Networked Public Address and Paging System”
   7. Section 27 51 19 “Sound Masking Systems”
   8. Section 28 13 00 “Access Control”
   10. Section 27 00 00 "Intermountain Healthcare Networked Structured Cable & Standards" for cabling used for voice and data circuits.

1.3 DEFINITIONS

A. Outlet Box: Electrical box used to support utilization equipment such as a receptacle or light fixture.

B. Pull Box: Electrical box through which branch circuit or feeder conductors are run but are not spliced.

C. Junction Box: Electrical box used for splicing branch circuit or feeder conductors.

D. Multiwire Branch Circuit: A branch circuit as defined by the National Electrical Code that shares a grounded conductor between two or more phase conductors.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SINGLE CONDUCTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Alpha Wire Company.
   2. Belden Inc.
   3. Cerro Wire LLC.
   5. General Cable; General Cable Corporation.
   7. Thomas & Betts Corporation; A Member of the ABB Group.

B. Aluminum and Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2, Type XHHW-2 and Type SO.

2.2 MULTI-CONDUCTOR CABLES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Southwire Company.
   2. AFC Cable Systems.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2, Type XHHW-2 and Type SO.

D. Multi-conductor Cable, Type AC-HCF:
   1. Armor: Galvanized Interlocking Steel Strip (green striped or solid green).
   2. Conductors: Solid Copper
   3. Conductor Insulation: THHN-2 with individual moisture resistant, fire retardant paper wrap on each individual conductor.
   5. Neutral(Grounded) Conductor: White for 120Y/208 volt systems and Grey 480Y/277 volt systems.
   7. References and Ratings:
      a. UL 4, 83, 1479, 1581, 2556, File Reference E7330
      b. NEC 250.118(8), 300.22(C), 392, 320, 517.13, 518, 645
      d. UL Classified 1, 2, and 3-hour through (Fire) penetration product, R–14141
      e. Environmental Air-Handling Space Installation per NEC 300.22(C)
E. Other Multi-conductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for Type SO with ground wire.

2.3 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. 3M.
   2. AFC Cable Systems; a part of Atkore International.
   4. Ideal Industries, Inc.
   5. ILSCO.
   6. O-Z/Gedney; a brand of Emerson Industrial Automation.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.4 CORD REELS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. APC Group; Kitchen Leash

B. Case (housing):
   1. Dimensions: 9” x 12” x 3’
   2. Material: Molded Polypropylene 3.175 mm thickness
   3. 94v-2 flammability rating

C. Power Cord
   1. Conductors: 14/3 AWG copper type SJOW
   2. Length: 10 feet
   3. Rating: 200 degrees F

D. Receptacle/Plug
   1. Rated: 125vac/20 amp
   2. Receptacle: NEMA 5-15P
   3. Plug: Dual Duplex rated 20 amp

E. Mounting Bracket: Designed for installation on the ceiling type where the cord reel will be installed.

2.5 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.

B. Comply with NFPA 70.
PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for feeders smaller than No. 4 AWG; for feeders No. 4 AWG and larger provide copper feeders unless aluminum is specifically indicated on the one-line diagrams. Solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Refer to Section 26 05 33 “Raceways and Boxes for Electrical Systems” for raceway types and applications.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.

D. Feeders below Slabs-On-Grade, and Underground: Type THWN-2, single conductors in raceway.

E. Multiwire Circuits: may not be used for branch circuit wiring. All 120 volt and 277 volt circuits shall be provided with a dedicated grounded conductor (neutral) for each phase conductor. Up to three of these circuits may be installed in a single conduit but not more than one conductor of each phase may be installed in a single conduit. Specification Writer’s Comment – Installation of more than 3 circuits in a homerun conduit, as a Value Engineering possibility, has been discussed with the Design-Assist Electrical Contractor but has not yet been approved.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
   1. Armored cable, Type AC-HCF may be installed for normal and equipment system single branch circuits concealed in walls, and partitions in lengths between outlet boxes 30’ or less and not as homeruns or wiring between pullboxes or junction boxes.
   2. Armored cable, Type AC-HCF may be installed between the first outlet box concealed in a wall or partition and a junction box above an accessible ceiling immediately above the location where the cable exits the wall or partition framing.

G. Branch Circuits below Slabs-on-Grade and Underground: Type THHN/THWN-2, single conductors in raceway. Installation of raceways within any concrete slab or composite concrete and steel deck is prohibited. NEC 517.13 (A) requires that all branch circuits serving patient care areas are provided with an effective ground-fault current path by installation in a metal raceway system, or a cable having a metallic armor or sheath assembly that qualifies as an equipment grounding conductor. Metallic raceways are not a specified raceway for branch circuits installed below slabs-on-grade. To assure compliance with the NEC requirement, both initially and when remodels occur in the future, the installation of branch circuit wiring under slabs-on-grade is limited to circuits supplying only the following rooms and area types without extension beyond the room or area to a room or area not listed here:
   1. Mechanical Spaces.
   2. Electrical Rooms.
3. **Food Service.**

H. Branch circuit wiring may also be installed under slabs-on-grade to supply power for the following:
   2. Floor Boxes.
   3. Direct wired equipment that is not located against a wall.

I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain-relief device at terminations to suit application.

J. Isolated Power System Conductors: #10 AWG, Type XHHW-2 stranded with cross-linked PE insulation and a dielectric constant of 3.5 or less, installed in EMT conduit.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values. Do not use pulling compounds or lubricant for installation of branch circuit conductors for Isolated Power Systems.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

### 3.4 CORD REELS

A. Coordinate location of cord reels to align with kitchen equipment supplied by the cord reel.

B. Fasten brackets to structure using minimum 3/8" threaded rod and to rigidly support the cord reel. Minimum of 2 rods per bracket with addition if required to provide a rigid support.

C. Adjust cord stopper as coordinated with owner.

### 3.5 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.  
   1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.6 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with panel and circuit number and identify as spare conductor.

3.7 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.8 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Firestopping."

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. After installing conductors and cables and before electrical circuitry has been energized, test feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements.
      a. Imaging Equipment
   2. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
      a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
      b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
      c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

B. Test and Inspection Reports: Prepare a written report to record the following:
   1. Procedures used.
   2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION
SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section Includes:
1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

B. Related Requirements:
1. Section 26 05 48.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
      a. Hangers.
      b. Steel slotted support systems.
      c. Nonmetallic support systems.
      d. Trapeze hangers.
      e. Clamps.
      f. Turnbuckles.
      g. Sockets.
      h. Eye nuts.
      i. Saddles.
      j. Brackets.
   2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. For fabrication and installation details for electrical hangers and support systems.
   1. Trapeze hangers. Include product data for components.
   2. Steel slotted-channel systems.
   3. Nonmetallic slotted-channel systems.
   4. Equipment supports.
   5. Vibration Isolation Base Details: 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 hangers and supports for electrical systems.
   1. Include design calculations and details of trapeze hangers.
2. Include design calculations for seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Suspended ceiling components.
   2. Structural members to which hangers and supports will be attached.
   3. Size and location of initial access modules for acoustical tile.
   4. Items penetrating finished ceiling, including the following:
      a. Lighting fixtures and lighting control.
      b. Electrical power devices
      c. Communications devices.
      d. Air outlets and inlets.
      e. Speakers.
      f. Fire sprinklers.
      g. Access panels.
      h. Projectors.
      i. Fire alarm system devices.
      j. Nurse call system devices.

B. Seismic Qualification Certificates: For hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design hanger and support system.

B. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
   2. Component Importance Factor: 1.5.
C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame Rating: Class 1.
   2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
   1. Material: Galvanized steel.
   2. Channel Width: Use 1-1/4 inches (31.75 mm) where possible and minimum 13/16 inches (20.64 mm) where necessary due to space restrictions.
   3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   4. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for electrical conductors in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
   4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
   5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.
PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as scheduled in NECA 1, where Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 3/8 inch (9 mm) in diameter.

D. Multiple Raceways: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports with single-bolt conduit clamps.

E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMTs, IMCs, and RMCs may be supported by openings through structure members, according to NFPA 70. Only prefabricated openings in structure members may be used. Do not create openings in structure members unless directed to do so by the structural engineer of record.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Existing Concrete: Expansion anchor fasteners.
   5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
   6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
   7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on 13/16 inches (20.64 mm) slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 05 50 00 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03 30 00 "Cast-in-Place Concrete" or Section 03 30 53 "Miscellaneous Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:
   1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   2. Install anchor bolts to elevations required for proper attachment to supported equipment.
   3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Section 09 91 13 "Exterior Painting", Section 09 91 23 "Interior Painting" and Section 09 96 00 "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.
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. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

B. Related Requirements:
1. Section 26 05 43 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For color coded EMT conduit, surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. LEED Submittals:
1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
D. Samples: For receptacle raceways and for each color and texture specified, 12 inches (300 mm) long.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
   1. Structural members in paths of conduit groups with common supports.
   2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Qualification Data: For professional engineer.

C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
   4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. ARC: Comply with ANSI C80.5 and UL 6A.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. EMT: Comply with ANSI C80.3 and UL 797. Factory applied color finish available in black, orange, green, purple, red, yellow, blue, and white. Refer to Specification Section 26 05 53 “Identification for Electrical Systems” for color coding of raceways.

F. FMC: Comply with UL 1; zinc-coated steel.

G. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
   1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
   2. Fittings for EMT:
      a. Material: Steel.
      b. Type: compression.
3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

I. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

C. LFNC: Comply with UL 1660.

D. Continuous HDPE: Comply with UL 651B.

E. RTRC: Comply with UL 1684A and NEMA TC 14.

F. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

G. Fittings for LFNC: Comply with UL 514B.

H. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

I. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services’ “Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.”

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.  
1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Hinged type unless otherwise indicated.

D. Finish: Manufacturer’s standard enamel finish.

2.4 RECEPTACLE RACEWAYS

A. Listing and Labeling: Receptacle raceways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Surface Metal Raceways: Aluminum with snap-on covers complying with UL. Clear anodized finish.
   1. Raceways for receptacles only: Wiremold AL3300 series.
   2. Raceways for applications where both receptacles and data devices are installed in the raceway and at all laboratory locations: Wiremold ALA4800 series two-channel and dual-cover. Satin anodized finish.
   3. Provide duplex receptacles at 12 inches on center in all receptacle raceways. Provide GFCI receptacles as noted on drawings.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.


F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

J. Device Box Dimensions:
   1. Wiring Devices other than data or communications devices: Minimum 4 inches square by 2-1/8 inches deep with switch ring as required for the device configuration and wall or ceiling surface. Where light switches are indicated at a common location provide multi-gang boxes to accommodate the quantity and type of switches indicated. Where deeper boxes are required provide masonry type boxes which do not require a separate switch ring.
   2. Data and communications devices: Minimum 4-11/16 inches square by 3 inches deep with single-gang 5/8 inch deep (or deeper if wall or ceiling finish is deeper) ring.

K. Pull boxes behind monitors: Minimum 6 inches square by 3-1/2 inches deep with two-gang ring.

L. Gangable boxes are prohibited.

M. Partitions: Provide partitions to separate emergency system conductors from conductors or other systems, where voltage between adjacent switches exceeds 300 volts and where switches controlling Low Voltage Controllers for interface to Nurse Call systems are installed in common boxes with line voltage switches.
N. **Hinged-Cover Enclosures:** Comply with UL 50 and NEMA 250.
   1. **Indoor:** Type 1 with continuous-hinge cover with flush latch unless otherwise indicated. Steel, finished inside and out with manufacturer's standard enamel.
   2. **Outdoor:** Type 4X with continuous-hinge cover with flush latch unless otherwise indicated. 304 stainless steel with smooth brushed finish.
   3. **Interior Panels:** Steel; all sides finished with manufacturer's standard enamel. Provide interior panels when there are control devices or power blocks located inside the enclosure.

O. **Handholes and Boxes for Exterior Underground Wiring:** Refer to Specification Section 26 05 43 “Underground Ducts and Raceways for Electrical Systems”.

2.6 **PUTTY PADS**

A. Moldable intumescent wall opening-protective pads designed for application to the back of electrical outlet boxes prior to installation of the wall finish to provide up to 2-hour fire barrier ratings and minimum Sound Transmission Class (STC) of 52 when tested in an STC-53 rated wall assembly or 59 according to ASTM E90-97.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. 3M Company.
   2. Hilti

PART 3 - EXECUTION

3.1 **RACEWAY APPLICATION**

A. **Outdoors:** Apply raceway products as specified below unless otherwise indicated:
   1. Exposed Conduit: GRC or IMC.
   2. Concealed Conduit, Aboveground: EMT.
   4. Underground Conduit for feeders: Refer to Specification Section 26 05 43 “Underground Ducts and Raceways for Electrical Systems”.
   5. Raceways Embedded in slabs or composite steel and concrete decks are prohibited.
   6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

B. **Indoors:** Apply raceway products as specified below unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT.
   2. Exposed, Not Subject to Severe Physical Damage: EMT.
   3. Exposed and Subject to Severe Physical Damage: GRC or IMC. Raceway locations include the following:
      a. Loading dock.
      b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
      c. Mechanical rooms below 8 feet.
      d. Gymnasiums.
   4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
   5. Feeder Raceways under Slabs: RNC, Type EPC-40-PVC encased in not less than 2 inches of 3000 psi concrete. Change from RNC, Type EPC-40-PVC to GRC or IMC before rising above floor.
6. Branch Circuit Raceways under Slabs: Refer to Specifications Section 26 05 19 “Low-Voltage Electrical Power Conductors and Cables” for allowable application of under slab raceways. RNC, Type EPC-40-PVC direct buried. Change from RNC, Type EPC-40-PVC to GRC or IMC before rising above floor.

7. Raceways Embedded in slabs or composite steel and concrete decks are prohibited.

8. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.

9. Damp or Wet Locations: GRC or IMC.

10. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4X, 304 stainless steel in kitchens and damp or wet locations.

11. C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.

2. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.

3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

G. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Separation of Life Safety and Critical Branch Wiring: Comply with NFPA 70 Article 517.

C. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

D. Complete raceway installation before starting conductor installation.

E. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.

F. Arrange stub-ups so curved portions of bends are not visible above finished slab except where concealed in chases.

G. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
H. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

I. Support conduit within 12 inches (300 mm) of enclosures to which attached.

J. Raceways Embedded in Slabs are prohibited.

K. Stub-ups to Above Recessed Ceilings:
   1. Use EMT, IMC, or RMC for raceways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

L. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

M. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

N. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

O. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

P. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

Q. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

R. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

S. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

T. Surface Raceways:
   1. Install surface raceway with a minimum 2-inch (50-mm)radius control at bend points.
   2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

U. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
V. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where an underground service raceway enters a building or structure.
   3. Where otherwise required by NFPA 70.

W. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

X. Expansion(Seismic)-Joint Fittings:
   1. Install flexible metal conduit at all locations where conduits cross building or structure expansion joints. Allow for minimum 4 inches deflection in all directions or greater if expansion joint exceeds 4 inches. Provide droop in flexible conduit to accommodate movement. Do not loop the flexible conduit. When calculating total bend degrees in conduit runs with expansion fittings use minimum 60 degrees for each expansion-joint fitting.
   2. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

Y. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   1. Use LFMC in damp or wet locations.

Z. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

AA. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

BB. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

CC. Locate boxes so that cover or plate will not span different building finishes.

DD. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

EE. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

FF. Set metal floor boxes level and flush with finished floor surface.

GG. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
3.4 FIRESTOPPING AND SOUND TRANSMISSION MITIGATION

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 “Penetration Firestopping.”

B. Install putty pads with acoustical and firestopping capabilities on all boxes that are installed in wall or partition cavities and in gypsum board ceilings.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION
DIVISION 27 - COMMUNICATIONS

Section 27 0000  Common General Conditions for Communication Sections
Section 27 0100  Operation and Maintenance of Communications Systems
Section 27 0113  Warranty Product and System
Section 27 0119  Field Testing and Reporting
Section 27 0133  Shop Drawings, Product Data, Samples, Design Records and Existing Conditions
Section 27 0143  Qualifications and Required Training for Contractor and Installer
Section 27 0171  Responsibility and Workmanship of Contractor
Section 27 0500  Common Work Results for Communications
Section 27 0526  Grounding and Bonding for Communications Systems
Section 27 0533  Conduits and Backboxes for Communications Systems
Section 27 0543  Campus Cable Routing
Section 27 0553  Identification for Low-Voltage Cables and Labeling
Section 27 1000  Equipment Room Fitting
Section 27 1119  Termination Blocks and Patch Panels
Section 27 1500  Horizontal Cabling
Section 27 1543  Faceplates and Connectors
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Section 27 6001  Appendix 01 – Deviation Request Process
Section 27 6002  Appendix 02 – Document Refresh Process
Section 27 6004  Appendix 04 – Reference Standards
Section 27 6005  Appendix 05 – Definitions and Abbreviations
Section 27 6006  Appendix 06 – Material Suppliers
Section 27 6007  Appendix 07 – Seimon Certified Installation Firms
Section 27 6008  Appendix 08 – Lead Wall Penetrations
SECTION 27000

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
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 caulking, you must remove all of the caulking 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
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
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
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
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 Ile or Ili 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 50/125µm and 62.5/125µm 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 50/125µm and 62.5/125µm multimode cabling and both 1310 nm and 1550 nm for 8.5/125µm 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.
SECTION 270133

SHOP DRAWINGS, PRODUCT DATA, SAMPLES
DESIGN RECORDS & EXISTING CONDITIONS

PART 1 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.1 SUBMITTALS

A. The Contractor:
   1. Shall not perform any portion of the work requiring submittal and review of shop drawings, product data, or samples until Owner has approved the respective submittal. Such work shall be in accordance with approved submittals.
      a. Shop drawings as required by the owner or as a minimum to include a minimum of two sets of a plan view and elevations of all work to be installed. The Contractor shall make any corrections required by the owner or the owner’s representative or consultant team, file with him two corrected copies and furnish such other copies as may be needed. The consultant’s approval of such drawings or schedules shall not relieve the Contractor from responsibility for deviations from drawings or specifications, unless he has in writing and called to the Architect’s attention such deviations at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings or schedules.

B. The Contractor shall provide a copy of the Certified Test Data Sheet, available from the delivering distribution warehouse for either a full run or cut piece from the Master Reel of the fiber cable to be installed
   1. The Certified Test Data Sheet shall include the Master Reel number, cable description, a passing test result with details, test equipment description, date certified, and a certificate of compliance stamp, and shall be included in the O&M Manual as a component of the final deliverables submittal package.

1.2 DRAWINGS

A. Shop Drawings
   1. The Contractor shall:
      a. Submit catalogue cut sheets that include manufacturer, trade name, and complete model number for each product specified. Model number shall be handwritten, marked with an arrow or underlined to indicate exact selection.
      b. Identify applicable specification section reference for each product performance for each component specified for approval prior to purchase and installation.

B. Record Drawings
   1. Drawings for the cabling system infrastructure elements shall be maintained and kept on file by the Siemon Certified Installer (Company) for the entire term of the warranty. Drawings shall include:
      a. Horizontal cable routing and terminations
      b. Telecommunications outlets/connectors
      c. Backbone cable routing and terminations
      d. Telecommunication Spaces (TS)

C. Samples
   1. For workstation outlet connectors, jack assemblies, housing and faceplates for color selection and evaluation of technical specifications and requirements. Confirm with Architect, interior designer, and Owner representative for color before purchasing materials. Face plates shall match the electrical face plates in Color and material type.
2. Upon request, provide samples for workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration.

3. Sample mock-up rooms may be required in some areas to ensure proper equipment placement and fit.

D. Qualifications:
   1. The Contractor shall provide the appropriate documentation to comply with the requirements set forth in Section 01 43 23 Qualifications, included with, and at the time of, bid submittal.

PART 2 - SUSTAINABLE DESIGN RECORDS AND REPORTS

2.1 DRAWINGS

A. Closeout Submittals (As-built Drawings):
   1. Communications Design drawings are to be supplied to the Architect to prepare the master “As-Built” drawings.
   2. As-Built drawings shall be in a format that is compatible with the format used by the Architect and consultant. Dimensions and scale of the drawing sheets submitted shall match the size of the drawing used for the contract documents and shall include the cable numbers labeled in accordance with this document.
   3. Utilize normal recognized drafting procedures that match standards, Architect and consultant guidelines and methodology.
   4. The As-Built drawings shall incorporate all changes made to the building identified in, but not limited to, addendum, change notices, site instructions or deviations resulting from site conditions.

B. Contractor shall:
   1. Clearly identify any resubmitted drawing sheets, documents or cut sheets either by using a color to highlight or cloud around resubmitted information.
   2. Maintain drawing numbering or page/sheet scheme consistency as per previously issued drawings/documents.
   3. Provide dimensioned plan and elevation views of networking components, showing:
      a. All communications data/voice outlet locations complete with outlet/cable labeling.
      b. Cable routing paths of communications cables to identified infrastructure pathways.
      c. All rack and cabinet locations and labeling thereof.
      d. One-line diagram of equipment/device interconnecting data/voice cabling of the data and voice systems.
      e. Standard or typical installation details of installations unique to Owner’s requirements.
   4. Submit one soft (compatible with Microsoft software) and hard copy with project deliverables within three weeks subsequent to substantial completion.
   5. Hard copy of floor plans for record shall be plotted to a standard, saleable, identified drawing scale.

2.2 RECORDS AND REPORTS

A. All records shall be created by the installation contractor and turned over at the completion of work.
   1. The format shall be computer based
      a. Soft copies and hard copies shall be part of the As-built package.
      b. The minimum requirements include:

         1) Cable records must contain the identifier, cable type, termination positions at both ends, splice information as well as any damaged pairs/conductors.
2) Connecting hardware and connecting hardware position records must contain the identifier, type, damaged position numbers, and references to the cable identifier attached to it.

2. Test documentation on all cable types shall be included as part of the As-built package.

B. All Siemon Warranty Registration documents shall be included.

C. All reports shall be generated from the computer-based program used to create the records above. These reports should include but not limited to:
   1. Cable Reports
   2. Cross-connect Reports
   3. Connecting Hardware Reports

PART 3 - EXISTING CONDITIONS SITE SURVEY

3.1 SITE SURVEY

A. Prior to placing any cable pathways or cable, the contractor shall survey the site to determine job conditions will not impose any obstructions that would interfere with

B. the safe and satisfactory placement of the cables. The arrangements to remove any obstructions with the Project Manager need to be determined at that time.

END OF SECTION
PART 1 - GENERAL INSTALLLER 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
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 Reptrax 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 COMMUNICATIONS

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
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 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
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 to 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 terminated in the telecommunications rooms using SC or LC connectors 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. Labels Identification (Labeling) System:
      a. Brady
      b. Dymo
      c. Hellerman-Tyton
      d. Panduit
      e. 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
      1) Data & IP Phones
      2) Analog Phone
      3) Security Card Readers
      4) IP Security Cameras
      5) Fire Systems
      Color
      Blue
      Blue
      Grey/Yellow
      Blue
      Red
6) TV Coax Black
7) Public Address/Telecom Patching in TEC only White
8) Clinical Engineering –
   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
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
   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. Forseer 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 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
   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 foreseer 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 foreseer 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 foreseer 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 programming 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 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
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/connector 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. The combined length of jumpers, patch cords inclusive of equipment cables in the Floor Distributor/Horizontal Cross-connect shall not exceed 5m (16 ft.).

3. 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 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 should include and 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 1st (xx) to specify length. Use 2nd (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
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

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
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
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”
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”.
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”
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”
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
   c. BICSI – Network Design Reference Design Manual
22. Underwriters Laboratories (UL) Cable Certification and Follow-Up Program.
23. National Electrical Manufacturers Association (NEMA)
25. National Electrical Code (NEC) NFPA70 2020
27. Institute of Electrical and Electronic Engineers (IEEE)
28. UL Testing Bulletin
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
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.
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@mail.org
42. ICT = Information and Communications Technology – Melissa.Lopez2@imail.org

END OF SECTION
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

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

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

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

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

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

B. The Siemon Company is represented locally by: Marc.Lovestrand@Siemon.com

END OF SECTION
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 2018-12-01.

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 / www.iescomm.com
   b. Boyd Evans – Project Manager // Phone 801 975 8191 / Fax 385 242 7366 / Mobile 801 381 1518 // Boyd.Evans@iescomm.com / 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 / www.cve.com
   b. Brad Readicker – Acct. Manager // Phone 801 908 2686 / Fax 801 908 7401 // Brad.Readicker@cve.com / 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 / 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@huntelectric.com / www.huntelectric.com
7. **NCNS Communications**: 419 West Universal Circle, Sandy, UT 84070
   a. Jayson Nosack – Owner // Phone 801 361 4572 // Jnosack@ncns-co.com / www.ncns-co.com
8. **Data Plus**: 769 Middlelegate Road, Henderson, NV 89118
   a. Chris Tettamanti – Project Manager // Phone 702 795 3282 // 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 / 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
    b. Adrian Youngblood – Sr. Estimator // Phone 702 258 1455 // ayoungblood@rosendin.com
    c. Breck Hardesty – Sr. Project Mgr. // Phone 702 258 1428 // bhardesty@rosendin.com / 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
DIVISIONS 28 thru 48

Not Used