KONA COMMUNITY HOSPITAL

New Clinical Lab, Ultrasound Room, & Miscellaneous Alterations

Kealakekua, Hawaii

HAWAII HEALTH SYSTEMS CORPORATION
Kona Community Hospital
79-1019 Haukapila Street
Kealakekua, HI 96750
TMK: 7-9-010: 081

SPECIFICATIONS

100% CD SUBMITTAL (DRAFT)

MAY 2020

KONA COMMUNITY HOSPITAL

New Clinical Laboratory, Ultrasound Room & Miscellaneous Alterations
Kealakekua, Island of Hawaii, Hawaii

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SECTION 00400 – BID PROPOSAL FORM

Hawaii Health Systems Corporation
Kona Community Hospital (Owner)
79-1019 Haukapila Street
Kealakekua, Hawai'i 96750

Attn: Yvonne S. Taylor, Senior Contracts Manager

Dear Yvonne:

The undersigned has carefully examined the attached plans and specifications marked "NEW CLINICAL LAB, ULTRASOUND ROOM, & MISCELLANEOUS ALTERATIONS" and hereby proposes to furnish at his/her own expense all labor, materials, tools, and equipment necessary to construct in place complete, all the work and construction as shown and called for, all in accordance with the true intent and meaning of the plans and specifications, general conditions, contract and bonds, as follows:

BASE BID - LUMP SUM PRICING

All work and construction as shown and called for to complete the Work for the lump sum of {all taxes shall be included in the lump sum amount(s)}:

		New Clinical Laboratory	**New Ultrasound Room**
1.	Division 1: General Requirements	$_____	$_____
2.	Division 2: Site Work	$_____	$_____
3.	Division 3: Concrete	$_____	$_____
4.	Division 5: Metals	$_____	$_____
5.	Division 6: Wood and Plastics	$_____	$_____
6.	Division 7: Thermal and Moisture Protection	$_____	$_____
7.	Division 8: Doors and Windows	$_____	$_____
8.	Division 9: Finishes	$_____	$_____
9.	Division 10: Specialties	$_____	$_____

10.	Division 13: Special Construction	$_____	$_____
11.	Division 15: Mechanical	$_____	$_____
12.	Division 16: Electrical	$_____	$_____
	SUBTOTALS (Items 1 – 12)	$_____	$_____

COMBINED BASE BID LUMP SUM SUBTOTAL: $_____

VARIABLE QUANTITIES UNIT PRICES (VQUP)

(See Section 01270 for detailed explanation)

Item No.	Description	Quantity	Unit	Unit Price	Subtotal Cost
1.	Firestopping	360	LF	$	$

VQUP SUBTOTAL: $_____

TOTAL LUMP SUM BASE BID:
(BASE BID LUMP SUM SUBTOTAL+VQUP SUBTOTAL): $_____

Total in Words

_____

ALTERNATE NO. 1

	New Clinical Laboratory	**New Ultrasound Room**
Rigid Insulation for ducts and flexible insulation at duct joints. (See Section 15080)		
Identify the Additive Amount:	$_____	$_____

ALTERNATE NO. 1 SUBTOTAL: $_____

ALTERNATE NO. 2

	New Clinical Laboratory	**New Ultrasound Room**
Routing reheat pipe from Storage. (See Section 15081)		
Identify the Additive Amount:	$_____	$_____

ALTERNATE NO. 2 SUBTOTAL: $_____

The Contractor further agrees to complete the work as noted under the TOTAL LUMP SUM BASE BID above on or before the scheduled date and/or time frame as noted in the Request for Proposals (Competitive Sealed Proposals).

It is understood that the award of contract will be made as noted in the Request for Proposals.

It is understood and agreed that the Owner reserves the right to reject any and/or all bids and waive any defect when, in his/her opinion, such rejection or waiver will be for the best interest of the Owner.

The undersigned hereby agrees that the award of this Contract shall be conditioned upon funds being made available for this project and further upon the right of the Owner to **hold all bids received for a period of ninety (90) days of the opening thereof, during which time no bid may be withdrawn.**

Upon acceptance of the proposal by the Owner, the undersigned hereby agrees to enter into and execute a contract for the same.

The Contractor shall acknowledge receipt of any and all addenda issued by the Architect by recording the date of receipt of the respective addenda in the space provided as follows:

ADDENDUM NO. 1	_____	ADDENDUM NO. 2	_____
ADDENDUM NO. 3	_____	ADDENDUM NO. 4	_____
ADDENDUM NO. 5	_____	ADDENDUM NO. 6	_____

It is understood that failure to receive any such addenda shall not relieve the Bidder from any obligation under this Proposal as submitted.

Submit your bid proposal as noted in the Request for Proposals.

Enclosed are:

1. Current (within the last 30 days) Certificate of Vendor Compliance.

2. Current (within the last 30 days) Certificate of Good Standing.

3. Evidence of the authority of the signing officer to submit bids on behalf of the Company.

4. KCH Require Documentation/Compliance Documents:
   - W-9
   - Vendor Terms and Conditions (If any)
   - Confidentiality Agreement (Exhibit H)
   - General Excise License (Copy)
   - General Contractor License (Copy)
   - Letter from Surety Committing to Provide

(CORPORATE SEAL)

Respectfully submitted,

_____

Name of Company

By _____

Signature

Title _____

Contractor's License _____

RME: _____

Federal ID: _____

G.E.T License _____

Date: _____

Address: _____

_____

_____

Telephone: _____

The following shall be added to and be considered a part of the proposal:

All Bidders shall include in his bid on this form the names of each person or firm to be engaged by the Bidder on the Project as joint contractor or subcontractor and shall also indicate the name and scope of the work to be performed by such joint contractor or subcontractor. This list shall not be added to or altered without the written consent of the Architect. Failure to comply with the above shall be sufficient cause for rejection of the bid. If no joint contractor or subcontractor is to be engaged, indicate "NONE".

Name, Address, Telephone No. of Joint Contractor or Subcontractor (Complete Firm Name)	Nature and Scope of Work

END OF SECTION

SUBSTITUTION REQUEST FORM

SUBSTITUTION REQUESTS WILL BE CONSIDERED NO LATER THAN 10 DAYS PRIOR TO BID SUBMITTAL

TO: Erskine Architects, Inc.

SECTION NUMBER: _____ PARAGRAPH: _____

SPECIFIED ITEM: _____

PROPOSED SUBSTITUTE: _____

Attach description, designation, catalog number, data sheets, other technical data, laboratory tests and samples as applicable for evaluation of proposed substitution. List features which are at variance with bidding document requirements. See page 3 for instructions.

If there is an engineered substitution, submit the engineered calculations and certification(s) that they have met or exceeded the contract requirements. Failure to provide this information may result in a rejection of the substitution request.

State below why substitution should be considered for this project and indicate in detail how substitution will affect guarantees, other trades, products, dimensions, etc. Attach additional pages as required to describe any change to project. Use of acceptable substitutions is subject to the requirements of Section 01600 – Product Requirements.

_____

_____

_____

_____

SUBMITTED BY: _____
(Firm Name)

_____
(Address, City, State, Zip Code)

_____ _____ _____ _____
(Telephone) (Name) (Signature) (Date)

ARCHITECT'S REVIEW/COMMENTS

Remarks:

_____

_____

☐ Accepted

☐ Accepted as noted

☐ Not accepted

☐ Received too late

BY: _____

INSTRUCTIONS FOR SUBMITTING SUBSTITUTION

1. Submit a separate substitution request for each type of product or equipment.
2. For substitution requests which include a number of individual related items, such as hardware, paint, fixtures, etc., submit one request for the broad category of related items.

   Attach a summary sheet listing each individual item covered by the request, the item specified and its proposed substitution.

   Identify the accompanying supporting data for each item by the letter or numeral designation used on the summary sheet.
3. Submit substitution requests with attached supporting data as follows:

   Four (4) copies for products relating to Structural, Mechanical or Electrical.

   Three (3) copies for other products.
4. Mark the words “Substitution Request” conspicuously on the outside of the envelope when submitting the request.
5. Substitution Requests submitted by other than the General Contractor will not be considered.
6. Substitution Requests not submitted on a copy of this form will not be considered.
7. Substitution Requests submitted by facsimile machine will not be accepted nor responded to.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01100 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Contract description.

B. Contract use of premises.

C. WEST HAWAII FACILITIES DIRECTOR (WHFD) AND/OR PROJECT MANAGER furnished/WHFD AND/OR PROJECT MANAGER installed products.

D. WHFD AND/OR PROJECT MANAGER furnished/contractor installed products.

E. Hospital occupancy.

1.02 RELATED SECTIONS

A. Section 01260 – Contract Considerations.

B. Section 01732 – Cutting & Patching.

1.03 CONTRACT DESCRIPTION

A. The project involves two primary areas of work on the Ground Floor of Kona Community Hospital: (1) Renovation of old Maintenance Space to a new Clinical Laboratory and (2) Renovation of an old Men's Locker Room to a new Ultrasound Room. Also included are miscellaneous alterations, repairs and/or improvements to adjacent spaces.

B. The Work of the contract generally includes, but is not limited to the following:

1. Renovation of the new Clinical Laboratory (old Maintenance Space):

a. Selective demolition of interior and exterior components.

b. Sawcutting, trenching, and patching concrete floors.

c. Alteration of associated HVAC, electrical, communications, lighting, plumbing and fire sprinkler systems.

d. Replacement of exterior louvers and providing air intake plenums.

e. Removing an exterior louver and infilling the wall penetration.

f. Adding fire dampers for all duct penetrations through fire rated walls.

g. Firestopping all new and/or existing penetrations through fire rated walls.

h. Replacing non-rated doors with rated doors at fire rated walls.

i. New partitions, doors, acoustical ceiling tiles, gyp bd ceiling, flooring, wall protection, paint, lighting, AC supply/registers, fire sprinklers, plumbing stub outs, and electrical work.

2. Renovation of the new Ultrasound Room (old Men's Locker Room):

a. Depressed concrete slab for new restroom.

b. Alteration of associated HVAC, electrical, communications, lighting, plumbing and fire sprinkler systems.

c. Adding fire dampers for all duct penetrations through fire rated walls.

d. Firestopping all new and/or existing penetrations through fire rated walls.

e. Sawcutting a door opening for a larger rated door.

f. New partitions, furred walls, doors, casework, countertop, acoustical ceiling tiles, gyp bd ceiling, flooring, wall protection, paint, lighting, select restroom accessories, AC supply/registers, fire sprinklers, plumbing fixtures, and electrical work.

g. Providing medical gas shut off valve and outlets.

3. Miscellaneous Alterations:

a. Relocation of reheat line to the adjacent Nuclear Medicine Room through the Mechanical Room.

b. Relocation of an existing fuel monitor from the old Maintenance Space to a fuel tank at the exterior.

c. Relocation of DDC System from the old Maintenance Space to the current Maintenance Building.

d. HAZMAT abatement for ceiling and wall repair.

e. Selective demolition of the adjacent spaces interior affected by the work.

f. Temporary removal and replacement of existing elements (such as, finishes, materials, devices, items, equipment, casework, ceiling, etc.) in

the adjacent spaces affected by the work.

1.04 CONTRACTOR USE OF PREMISES

A. Limit the use of premises to allow for continued Hospital occupancy.

B. Emergency Building Exits During Construction: Must remain open and unblocked at all times. Maintain access for staff, patients, and public. Egress must be maintained and way finding signage during construction.

C. Construction Operations: Limited to areas noted on Drawings.

D. Staging and Parking

1. Staging area and limited contractor employee parking will be made available on site. Contractor and vendor parking is designated. Any new parking arrangements require prior approval by the WHFD AND/OR PROJECT MANAGER.

E. Time Restrictions for Performing Work:

1. See Request for Proposal and coordinate w/ WHFD AND/OR PROJECT MANAGER. Submit written notice a minimum three days in advance to confirm working hours. Any work performed outside of the normal working hours shall be pre-approved by the WHFD and/or Project Manager.

F. Cooperate with Hospital to minimize conflict and to facilitate Hospital's operations. Coordinate operations with WHFD AND/OR PROJECT MANAGER.

G. Access to adjacent floors must be approved in advance by the WHFD AND/OR PROJECT MANAGER. Submit written notice not less than seven days in advance of intended work on adjacent floors.

H. Do not close or obstruct roadways without first consulting with the WHFD AND/OR PROJECT MANAGER. Conduct operations with minimum interference to public or private roadways.

I. Maintain vital services (as defined by the WHFD AND/OR PROJECT MANAGER) with the minimum of interruption. Outages and interruptions must be approved in advance by the WHFD AND/OR PROJECT MANAGER. Submit written notices of outages and interruptions not less than seven days in advance.

J. Contractor's personnel:

1. It is preferred that contractors park off site and carpool to hospital.
2. Contractor's personnel may use the hospital cafeteria.
3. Smoking is not permitted anywhere on KCH property. Consumption of food and beverages will not be permitted on the premises except in designated areas.
4. Playing of radios will not be permitted.
5. Shall be properly attired for work. (No tank tops, cut-off jeans, slippers, etc.)
6. Shall conduct themselves with decorum and courtesy toward staff, patients, and public.
7. Shall not use loud and offensive language.
8. Shall read and sign the Contractor's Guidelines Handbook.

K. Construction Zone Accessibility Requirements

1. General: Hawaii Revised Statutes (HRS) 103-05 requires this project to conform to the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG).
2. Ensure accessible routes to emergency entrances and exits to and from accessible parking public pedestrian routes during the construction period as required by ADAAG 4.1.1(4).
3. Temporary buildings and facilities that are not of permanent construction but are extensively used or are essential for public use for a period of time shall be accessible. Egress must be maintained and way finding signage during construction.
4. Provide temporary safe pedestrian passageway around a construction site.
    a. Areas that are used only as work areas shall be designed and constructed so that individuals with disabilities can approach, enter, and exit the areas.
    b. These guidelines do not require that any areas used only as work areas be constructed to permit maneuvering within the work area or be constructed or equipped (i.e., with racks or shelves) to be accessible.
    c. Follow OSHA guidelines concerning scaffolding and debris and dust

protection.

1.05 WHFD AND/OR PROJECT MANAGER FURNISHED/WHFD AND/OR PROJECT MANAGER INSTALLED PRODUCTS

A. Items noted “OFOI” (WHFD AND/OR PROJECT MANAGER Furnished/WHFD AND/OR PROJECT MANAGER Installed) will be furnished and installed by the WHFD AND/OR PROJECT MANAGER, including but not limited to:

1. Select medical equipment as noted on the drawings.
2. Select toilet accessories as noted on the drawings..
3. Movable furniture.

B. Hospital’s Responsibilities:

1. Return Hospital reviewed shop drawings, product, data and samples, to Contractor.
2. If requested by the Contractor, assist the Contractor with inspection of select equipment and/or accessories prior to installation.

C. Contractor’s Responsibilities:

1. Review WHFD AND/OR PROJECT MANAGER’s provided shop drawings, product data, and samples.
2. Provide any necessary utility roughs and backing, and install in accordance with manufacturer’s instructions.
3. Arrange and pay for product delivery to site.
4. Submit claims for transportation damage and replace damaged, defective or deficient items.
5. Arrange for manufacturers’ warranties, inspections and service.

1.06 HOSPITAL OCCUPANCY

A. The Hospital will remain operational during entire period of construction for the conduct of normal operations.

B. The Contractor is to coordinate the work and details within each phase, to minimize disruption to WHFD AND/OR PROJECT MANAGER’s operation. Advanced notification of a minimum of one week for disruption due to noise and

other construction activity is required as well as posting of signage in advance to advise occupants of such disruption.

C. Provide dust and noise barriers where specified under other portions of the contract documents. Follow ICRA procedures during construction, i.e., Policy #125-54 as attached. Walk off mats at site entrance shall be changed as needed. HEPA filtration units are to be utilized 24 hours per day throughout the construction process. Complete ISLM check sheet daily.

D. Schedule the Work, and cooperate with Hospital to minimize conflict with work involving dust and noise and odor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01120 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. 01732 – Cutting & Patching.

PART 2 - PRODUCTS

2.01 SALVAGED MATERIALS

A. Salvage sufficient quantities of cut or removed material to replace damaged work of existing construction, when materials not readily obtainable on current market.

B. Incorporate salvaged or used material only as indicated or with permission of the Hospital.

2.02 PRODUCTS FOR PATCHING AND EXTENDING WORK

A. New Materials: Match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspection and testing products where necessary, referring to existing Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that demolition is complete, and areas are ready for installation of new Work.

B. Beginning of restoration Work means acceptance of existing conditions.

3.02 PREPARATION

A. Cut, move or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specific for finished Work.

C. Remove debris and abandoned items from area and from concealed spaces.

D. Prepare surface and remove surface finishes to provide for proper installation of new work and finishes.

E. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate duct work and piping to prevent condensation in exposed areas.

F. Do not demolish, chip, or penetrate existing structural members without the expressed approval of the Prime Consultant.

G. Perform cutting and removal work to remove minimum necessary, and in a manner to avoid damage to adjacent work and provide proper surfaces to receive installation of repair and new Work.

3.03 INSTALLATION

A. Coordinate work of alterations and renovations to expedite completion and to accommodate Owner occupancy.

B. Project areas and Finishes: Complete in all respects including operational, carpentry, casework, mechanical and electrical work.

C. Remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition as appropriate.

D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.

E. In addition to specified replacement of equipment and fixtures, restore existing plumbing, ventilation, air conditioning, air balancing and electrical systems to full operational condition.

3.04 TRANSITIONS

A. Where new Work abuts or aligns with existing, perform a smooth and even transition. Patched Work to match existing adjacent Work in texture and appearance.

B. Cut finish surfaces such as masonry, tile, plaster, or metals by methods to terminate surfaces in a straight line at a natural point of division.

C. When finished surfaces are cut so that a smooth transition with new Work is possible, terminate existing surface along a straight line at a natural line of division. If a straight line cannot be achieved, install a reveal or other joint to create a straight line. Provide trim appropriate to finished surface subject to approval of Hospital's Representative.

3.05 ADJUSTMENTS

A. Where removal of partitions or walls result in adjacent spaces becoming one, rework floors, walls and ceiling to a smooth plane without breaks, steps or bulkheads.

B. Where a change of plane 1/4 inch or more occurs, submit recommendation for providing a smooth transition for the WHFD AND/OR PROJECT MANAGER review.

C. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.

D. At penetrations of fire-rated wall, ceiling or floor construction, completely seal voids with fire rated, fire resistant material, full thickness of the construction element. All remaining small gaps shall be properly sealed with firestopping.

3.06 REPAIR OF DAMAGED SURFACES

A. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.

B. Repair substrate prior to patching finish.

3.07 FINISHES

A. Finish surfaces as specified in individual Product Sections.

B. Finish patches to product uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersection with written approval of the WHFD AND/OR PROJECT MANAGER.

3.08 CLEANING

A. In addition to cleaning as specified in this specifications. Wet mop owner-occupied areas daily utilizing hospital's EPA approved disinfectant. Remove and replace soiled walk off (sticky) mats daily.

B. Clean spillage, over-spray, and dust in Owner- occupied areas immediately.

END OF SECTION

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.01 SUMMARY

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

B. The description of alternates is not intended to give a detailed description of all additional or deductive work required by the alternate item(s), as only the principal features of such additional or deductive work are listed.

C. Should any one or all of the alternates become a part of the contract, the cost of all additional incidental work required by the alternate item(s), even though not specifically mentioned herein, shall be deemed to already be included in the alternate price amount.

1.02 DEFINITIONS

A. Alternate: An amount proposed by Bidders (Offerors) and stated on the Bid Form for certain work defined herein that may be added to the Total Lump Sum Bid Price amount if State decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost for each alternate is the net addition to the Contract Sum to incorporate the alternate into the Work. No other adjustments are made to the Total Lump Sum Bid Price.

1.03 PROCEDURES

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

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: If the alternate(s) are accepted by the Hospital, 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.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SCHEDULE OF ALTERNATES

A. Alternate No. 1 Additive: Removal of existing flexible insulation from ducts and replacement with new rigid insulation for all straight ducts and new flexible insulation at all duct joints within the New Clinical Laboratory and New Ultrasound Room.

B. Alternate No. 2 Additive: Additional cost difference from the Base Bid of rerouting the reheat supply and return pipes from the Storage Room through four spaces (Storage, Lounge, Manager, and Hot Lab) to the Nuclear Medicine Room.

END OF SECTION

SECTION 01260 - CONTRACT CONSIDERATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Schedule of values.

B. Application for payment.

C. Change procedures.

1.02 RELATED SECTIONS

A. Section 01100 – Summary of Work.

B. Section 01290 – Payment Procedures.

C. Section 01310 – Project Management & Coordination.

D. Section 01770 – Closeout Procedures.

1.03 SCHEDULE OF VALUES

A. Submit a printed schedule of AIA Form G703- Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be acceptable.

B. Submit Schedule of Values in duplicate within 15 days after date of Owner Contractor Agreement.

C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section. Identify site mobilization and bonds and insurance.

D. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

E. Include within each line item, a direct proportional amount of Contractor's overhead and profit.

F. Revise schedule to list approved Change Orders, with each Application for Payment.

1.04 APPLICATIONS FOR PAYMENT

A. Submit each application electronically on AIA Form G702- Application and Certificate for Payment and AIA G703 - Continuation Sheet.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Payment Period: Invoice to be submitted to Hospital Technical Representative for the preceding month's work by the 5th day of the month that follows. (The State of Hawaii does its best to pay within 30 days).

D. Waiver of Liens: Provide unconditional waiver of liens. Use contractor's form.

1.05 CHANGE PROCEDURES

A. The following documents will be used. Sample forms are attached.

B. Request for Information: Standard Contractor form. A request for information shall be used by the Contractor to the Prime Consultant to request solutions to problems which are discovered during construction, to request drawings and cost and/or schedule impacts in the Request for Information.

C. Instruction Notice: Attachment 1, standard form.

1. Instruction Notice will be issued by the Prime Consultant for instructions to the Contractor which do not involve a change in the Contract Sum or construction period.

2. Instruction Notice authorizes the Contractor to proceed at once with the instruction included therein.

3. Instruction Notice which does affect the Contract Sum or construction period must have written authorization by the Owner's Project Manager. Such instruction shall have the note "Change Order to Follow" and then be followed with a Quotation Request, cross referenced to the Field Order.

4. Instruction Notice will be distributed as follows:

    a. Two copies to Contractor

    b. One copy to the Prime Consultant

    c. One copy to each appropriate Consultant

d. One copy to WHFD AND/OR PROJECT MANAGER

D. Quotation Requests: Attachment 2, standard Prime Consultant form.

1. Proposed changes to the Contract will be initiated by the Prime Consultant in the form of a Quotation Request.

2. A Quotation Request, indicating the party suggesting the change, will clearly describe the proposed Contract variation, accompanied by the required drawings, if necessary.

3. Construction work shall not proceed on the strength of a Quotation Request only.

4. Quotation Requests will be distributed as follows:

a. Two copies to Contractor.

b. One copy to Prime Consultant

c. One copy to each appropriate Consultant

d. One copy to Owner's Project Management

5. The Contractor shall respond to the Quotation Request within the time stated on the form.

E. Change Proposal. Standard Contract Form.

1. This form shall be issued by the Contractor for any claims he may have and in response to a Quotation Request.

2. The Change proposal shall include a description of the work and the requested change to the Contract sum and construction time.

3. All supporting documents, materials and subcontract quotations, time sheets, labor estimates, etc., shall be itemized and attached to the Change Proposal as necessary for proper checking by the Prime Consultant, Consultants and Owner's Project Manager.

4. Change proposals, if acceptable, will be signed by the WHFD AND/OR PROJECT MANAGER and Prime Consultant with one executed copy returned to Contractor. The Contractor shall thus have the authority to proceed with the work and Change Order will follow.

F. Change Order. Attachment 3, standard form.

1. This document is issued to the Contractor as an instruction for him to make a change to the work of the contract Documents.
2. Change Order documents are prepared by the Prime Consultant and countersigned by the Owner and Contractor.
3. Approved Change orders record the following information:
    a. Cross-reference to Change Proposal.
    b. Summarized description of change in work required.
    c. Change in completion date.
    d. Change in Contract sum.
    e. Identification of party/individual initiating change.

G. Record of Variations: Variations in construction from the plans and specifications shall be recorded by the Contractor as required in Division 1. These variations shall be brought to the attention of the Prime Consultant and WHFD ANS/OR PROJECT MANAGER by the Contractor.

H. Timeliness of Processing: Instruction notices, Quotation Requests and Change Proposals will be processed and one copy provided the WHFD AND/OR PROJECT MANAGER the same day the document is prepared.

I. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract Time as provided in the Contract Documents.

J. Maintained detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

OPTIONAL

INSTRUCTION NOTICE

INSTRUCTION NOTICE NO:
DATE: **PROJECT NO:**
PROJECT: Kona Community Hospital
New Clinical Laboratory, Ultrasound Room, & Misc. Alterations
CONTRACTOR:

Reference:
☐ **Specifications:**
☐ **Drawings:**
☐ **Other:**

YOU ARE HEREBY DIRECTED TO PROMPTLY EXECUTE THIS INSTRUCTION NOTICE WHICH REPRESENTS THE CONTRACT DOCUMENTS OR ORDERS MINOR CHANGES IN THE WORK.
If you consider that a change in Contract Sum or Contract Time is required, submit your itemized proposal to the Prime Consultant immediately and before proceeding with the work. If your proposal is found to be satisfactory and in proper order, this Instruction Notice will be superseded by a Change Order.

COPIES TO:
☐ **WHFD AND/OR PROJECT MANAGER**
☐ **Contractor**
☐ **Prime Consultant**
☐ **Structural**
☐ **Mechanical**
☐ **Electrical**
☐ **Civil**
☐ **Landscape**
☐ **Others**

OPTIONAL

QUOTATION REQUEST

QUOTATION REQUEST NO:
DATE: **PROJECT NO:**
PROJECT: Kona Community Hospital
New Clinical Laboratory, Ultrasound Room, & Misc. Alterations
CONTRACTOR:

Submit a fully itemized quotation for the inclusion of the following changes into the contract. This is not a Change Order, a Construction Change Directive, nor an Instruction to proceed with the work herein.

REQUEST ORIGINATED BY:

DATE QUOTATION REQUIRED BY:
COPIES TO:
☐ **WHFD AND/OR PROJECT MANAGER**
☐ **Contractor**
☐ **Others**

CHANGE ORDER

CHANGE ORDER NO:

DATE: **PROJECT NO:**

PROJECT: Kona Community Hospital
New Clinical Laboratory, Ultrasound Room, & Misc. Alterations

CONTRACTOR:

Original Contract Sum was:
Net changes by previously authorized Change Orders: $
Contract Sum prior to this Change Order was: $
Contract sum will be (increased) (decreased) (unchanged) by this Change Order $
New Contract Sum including this Change Order will be: $
The Contract Time will be (increased) (decreased) (unchanged) by days
The date of Substantial Completion as of the date of this Change Order is:

PRIME CONSULTANT: **WHFD AND/OR PROJECT MANAGER:**
CONTRACTOR:

By:_____ **Date:**_____
Approved by:_____ **Date:**_____
Accepted by:_____ **Date:**_____

SECTION 01270 - VARIABLE QUANTITIES UNIT PRICES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

1.02 DEFINITIONS

A. Unit price is an amount proposed by the Bidder (or Offeror) as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.03 RELATED DOCUMENTS

A. Variations in estimated quantities are governed by this Section, Section 00400, the Drawings and the General Requirements.

B. Measurement and payment for unit price items are governed by the General Requirements.

1.04 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, coordination overhead, and profit.

B. List of Unit Prices: A list of unit prices is included at the end of this Section. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

1. The description of Variable Quantities Unit Price items is not intended to give a detailed description of all work required, as only principal features of such work are listed.

2. Detailed descriptions are given in the appropriate Specification Sections or Drawings named in the general description below.

C. Include Variable Quantities Unit Price costs on the Bid Proposal form.

D. All computations of the Variable Quantities Unit Prices shall use the unit prices noted in the Bid Proposal Form. Measurements will be to the nearest estimated

unit quantity. Payment will be made for quantities actually installed at the applicable price, measured by the Offeror, concurred by the WHFD AND/OR PROJECT MANAGER, and acceptably completed.

E. The Variable Quantities Unit Prices are estimated quantities. Where the quantity of a pay item vary more than fifteen percent (15%) above or below the estimated quantity stated in the contract, an adjustment in the contract price shall be made upon demand by either the State or Contractor. The adjustment shall be based upon any increase or decrease in costs due solely to the variation above one hundred fifteen percent (115%) or below eighty-five percent (85%) of the estimated quantity.

F. Do not proceed with work exceeding the estimated quantities written in the Bid/Offer/Proposal Form until receipt of written approval by the WHFD AND/OR PROJECT MANAGER.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 LIST OF VARIABLE QUANTITIES

Unit Price No. 1: Firestopping - Provide firestopping around all penetrations through fire rated walls at the New Clinical Laboratory and New Ultrasound Room.

END OF SECTION

SECTION 01290 - PAYMENT PROCEDURES

PART 1 - PRODUCTS

1.01 GENERAL CONDITIONS

A. As specified in the Request for Proposals and the General Requirements.

1.02 RELATED SELECTIONS

A. Section 01260 - Contract Considerations.

B. Section 01770 – Closeout Procedures.

1.03 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 Application for Payment.

1.04 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

   a. Application for Payment forms with continuation sheets.

   b. Submittal schedule.

   c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to the Prime Consultant through the Hospital's Construction Management Representative at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use 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 Prime Consultant.

c. Prime Consultant's project number.

d. Contractor's name and address.

e. Date if submittal.

2. Arrange schedule of values using AIA Document G703.

3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each items 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 affected value.

   g. Dollar value of the following, as percentage of the Contract Sum to nearest on-hundredth percent, adjusted to total 100 percent.

      i. Labor.

      ii. Materials.

      iii. Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of two percent of the Contract Sum.

   a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling two percent of the Contract Sum and subcontract amount.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide 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.

7. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

8. 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.

9. Each item in the schedule of values and Application for Payments 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.

10. 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.

1.05 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as approved by the Hospital Construction Project Manager.

    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: Each progress payment shall be submitted monthly.

C. Payment Application Times: Submit Application for Payment to the Prime Consultant by the 5th day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

D. Application for Payment Forms: Use AIA G702 and Document AIA G703.

E. Application Preparation: Complete every entry on form. Contract number must be on every application for payment. The Prime Consultant will return incomplete applications, including those without the contract number, 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 for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide supporting documentation that verifies amount requested, such as paid invoices and/or photographs. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.

G. Transmittal: submit signed Application for Payment to Hospital Construction Project Manager (electronically or by hand delivery). Include waivers of lien and other similar required attachments.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.

2. When application shows completion of an item, submit conditional final or full waivers.

3. WHFD AND/OR PROJECT MANAGER reserves the right to designate which entities involved in the Work must submit waivers.

4. Waiver forms: Submit executed waivers of lien on forms acceptable to Owner.

I. Waiver of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-contractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. WHFD AND/OR PROJECT MANAGER reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or proceeded by conditional final waivers from every entity involved with performance of the work covered by the application who is lawfully entitled to a lien.
5. Waiver forms: Submit executed waivers of lien forms, acceptable to Owner.

J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Schedule of unit prices.
6. Submittal schedule (preliminary of not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal's consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

11. Initial progress report.

12. Report of preconstruction conference.

13. Certificates of insurance and insurance policies.

14. Performance and payment bonds.

15. Data needed to acquire Owner's insurance.

K. Application for Payment at Substantial Completion: After Prime Consultant issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for potion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract sum.

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

L. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.

2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.

4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims".

5. AIA Document G706A, "Contractor's Affidavit of Releases of Liens".

6. AIA Document G707, "Consent of Surety to Final Payment".

7. Evidence that claims have been settled.

8. Final liquidated damages settlement statement.

9. Alternate forms may be utilized with approval from the WHFD AND/OR PROJECT MANAGER & Contracts Manager

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01310 - PROJECT MANAGEMENT & COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General Coordination procedures.

B. Coordination drawings.

C. Requests for information (RFI's).

D. Project Web site.

E. Project Meetings.

1.02 RELATED SECTIONS

A. Section 01260 - Contract Considerations.

B. Section 01330 - Submittal Procedures.

C. Section 01770 – Closeout Procedures.

1.03 DEFINITIONS

A. RFI: (Request for Information), the Prime Consultant for seeking information required by or clarifications of the Contract Documents.

1.04 INFORMATION SUBMITTALS

A. Subcontract List: Prepare a written summary (provided in the Bid Proposal Form) identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Included the following information in tabular form:

1. Name, address and telephone number of company performing subcontract or supplying products.

2. The particular work to be performed by subcontractor.

B. Key personnel Names: Within 7 days of starting construction operations, submit a list of key personnel 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, office

and cellular telephone numbers and e-mail addresses. Provide names, addresses and telephone numbers of individuals assigned as alternates 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. Keep list current at all times.

1.05 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different 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 to ensure maximum performance and accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operations.

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 performance and accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

C. 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 of coordination of their Work is required.

D. 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. Pre-installation of conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designed as Owner's property.

1.06 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

    a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

    b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contracts in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.

    c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.

    d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.

    e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.

    f. Indicate required installation sequences.

    g. Indicate dimensions and show on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Prime Consultant indicating proposed resolution of such conflicts. Minor dimensions changes and difficulty installations will not be considered changes to the Contract.

B. Coordinating Drawing Organization: Organize coordination drawings as follows:

    1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements and mechanical, plumbing, fire-protection, fire-alarm and electrical work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.

    2. Plenum Space: indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related work. Locate components

within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas conflict between light fixtures and other components. All work to be seismically anchored utilizing TOLCO system.

3. Mechanical rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges and support systems. All work to be seismically anchored using TOLCO system.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire –rated enclosures around ductwork.
7. Electrical Work: Show the following:
    a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:

a. Locations of standpipes, main piping, branch lines, pipe drops and sprinkler heads.

9. Review: Prime Consultant will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Prime Consultant determines that coordination drawings are not being prepared in sufficient scope or details, or are otherwise deficient, Prime Consultant will so inform Contractor, who shall make changes as direct and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements on Section 013300 - Submittal Procedures.

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.

2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.

3. Prime Consultant will furnish Contractor one set of digital data files of Drawings for use in preparing coordinated digital data files.

a. Digital Data Software Program: Drawings are available in AutoCAD 2010.

b. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to WHFD AND/OR PROJECT MANAGER and Prime Consultant, if required by either party.

1.07 REQUESTS FOR INFORMATION (RFI'S)

A. General: Immediately of discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified to WHFD AND/OR PROJECT MANAGER.

1. All RFIs must be submitted directly by the Contractor of record. Prime Consultant will return RFI submitted to Prime Consultant by other entities controlled by Contractor 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.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Project Engineer.
6. RFI number; number sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, description, measures, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    a. Include dimensions, thickness, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
14. Response turnaround time needed.

C. RFI Forms: Contractor's form

1. Attachment shall be electronic files preferably in Adobe Acrobat PDF format.

D. Project Prime Consultant's Action: Project Prime Consultant will review each RFI, determine action required and respond within requested response time, typically 3 working days unless quicker response is needed as to not delay the project.

1. The following Contract-generated RFIs will be returned without action:

    a. Requests for approval of submittals.

    b. Requests for approval of substitutions.

    c. Requests for approval of Contractor's mean and methods.

    d. Requests for coordination information already indicated in the Contract Documents.

    e. Requests for adjustment in the Contract Time or Contract Sum.

    f. Requests for interpretation of Prime Consultant's actions on submittals.

    g. Incomplete RFIs or inaccurately prepared RFIs.

2. The Prime Consultant's action may include a request for additional information, in which case the time for response will date from time of receipt of additional information.

3. The Project Prime Consultant's action on RFIs that may result in a change to the Contract Time or the Contract sum may be eligible for Contractor to submit Change Proposal according to Section 01260 - Contract Considerations.

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify the WHFD AND/OR PROJECT MANAGER in writing within 3 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly to Prime Consultant.

1. Project name.

2. Name and address of Contractor.

3. Name and address of Project Prime Consultant.

4. RFI numbering including RFIs that were returned without action or withdrawn.

5. RFI description.

6. Date when the RFI was submitted.

7. Date when the Prime Consultant's response was received.

1.08 PROJECT MEETINGS

A. General: When applicable, schedule and conduct meetings at the Project site and other meetings to occur by teleconference and/or video conference (collectively referred to as "meetings").

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify WHFD AND/OR PROJECT MANAGER and Prime Consultant of scheduled meeting dates and times. It is preferred that a standing meeting day/time is planned at the commencement of the project.

2. Agenda: Contractor shall prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Sign in Sheet: Furnish and supply a copy of completed sheet to KCH.

4. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to all meeting attendees within five business days of the meeting.

B. Preconstruction Conference: the WHFD AND/OR PROJECT MANAGER will schedule and conduct a preconstruction conference before starting construction, at a time convenient to the Hospital, Contractor, and Prime Consultant, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.

2. Attendees: Authorized representatives of WHFD AND/OR PROJECT MANAGER, the Prime Consultant and their consultants; Contractor and its superintendent; major subcontractors; suppliers and other concerned parties. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items if significance that could affect progress, including the following:

a. Tentative construction schedule.

b. Critical work sequencing and long-lead items.

c. Designation of key personnel and their duties.

d. Lines if communications.

e. Procedures for processing field decisions and Change Orders.

f. Procedures for RFIs

g. Procedures for testing and inspecting.

h. Procedures for processing Application for Payment.

i. Distribution of the Contract Documents.

j. Submittal procedures.

k. Use of the premises.

l. Work restrictions.

m. Working hours.

n. Owner’s occupancy requirements.

o. Responsibility for temporary facilities and controls.

p. Procedures for moisture and mold

q. Procedures for disruption and shutdowns.

r. Parking availability.

s. Office, work, and storage areas.

t. Equipment deliveries and properties.

u. Security.

4. Minutes: The Contractor will be responsible for conduction of the meeting, will record and distribute meeting minutes.

C. Preinstall Conferences: Conduct a pre-installation conference at Project Site before each construction activity that requires coordination with other construction trades and/or installers.

1. Attendees: Installer and representatives of manufacturers and fabricators

involved in or affected by the installation and its coordination or integration with other materials and installation that have preceded or will follow, shall attend the meeting. Advise the WHFD AND/OR PROJECT MANAGER, Prime Consultant of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements to the following:

    a. Contract Documents.

    b. Options.

    c. Related RFIs.

    d. Related Change Orders.

    e. Purchases.

    f. Deliveries.

    g. Submittals.

    h. Possible conflicts.

    i. Compatibility requirements.

    j. Time schedules.

    k. Weather limitations.

    l. Manufacturer’s written instructions.

    m. Warranty requirements.

    n. Compatibility of materials.

    o. Acceptability of substrates.

    p. Temporary facilities and controls.

    q. Space and access limitations.

    r. Regulations of authorities having jurisdiction.

    s. Testing and inspecting requirements.

    t. Installation procedures.

u. Coordination with other work.

v. Required performance results.

w. Protection of adjacent work.

x. Protection of construction and personnel.

3. Record significant conference discussions, agreement, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date

D. Progress Meetings: Conduct weekly progress meetings, or at intervals necessary to the orderly progress of the Work.

1. Coordinate dates of meetings with preparation of payment requests.

2. Attendees: Representatives of the WHFD AND/OR PROJECT MANAGER, and the Contractor. The Project Prime Consultant will call in by telephone. The Prime Consultant will attend meetings in person when necessary. The Prime Consultant's subconsultants and Contractor's subcontractors may attend upon request.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

i. Review schedule for next period

b. Review present and future needs of each entity present, including the following:

i. Interface requirements.

ii. Sequence of operations.

iii. Owner operation issues/security.

iv. Status of submittals.

v. Deliveries.

vi. Off-site fabrication.

vii. Access

viii. Temporary facilities and controls.

ix. Status of RFIs.

x. Status of proposed requests.

xi. Pending changes.

xii. Status of change Orders.

xiii. Pending claims and disputes.

4. Minutes: The Contractor that is responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01330 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed Products list.

D. Shop Drawings.

E. Product Data.

F. Samples.

G. Manufacturer's installation instructions.

H. Manufacturer's certificates.

1.02 RELATED SECTIONS

A. Section 01310 – Project Management & Coordination.

B. Section 01400 - Quality Requirements.

C. Section 01500 – Temporary Facilities & Controls.

D. Section 01600 – Product Requirements.

E. Section 01730 – Execution Requirements.

F. Section 01732 – Cutting & Patching.

1.03 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Prime Consultant's responsive action.

B. Informational Submittals: Written information that does not require Prime Consultant's approval. Submittals may be rejected for not complying with requirements.

1.04 SUBMITTAL PROCEDURES

A. Transmit each submittal with AIA Form G810 or project Prime Consultant's accepted transmittal form.

1. Identify whether submittal is an action submittal or informational submittal.
2. Submit the number of duplicate documents and samples schedule in Part 3 below.

B. Sequentially number the transmittal form. Reverse submittals with original number and a sequential alphabetical suffix.

C. Identify Project Contractor, Subcontractor or supplier, pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's wax seal, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Prime Consultant at business address. Coordinate submission of related items.

F. For each submittal for review, allow 5 days excluding delivery time and from the contractor.

G. Identify variations from Contract Documents and Product of system limitations which may be detrimental to successful performance of the completed Work.

H. Submit all items relating to color selection at one time. Color selections will not be made until all color related submittals have been received.

I. Provide space for Contractor, Prime Consultant, and Consultants review stamps or initials.

J. Review and Resubmission of Submittals

1. The Prime Consultant will review the submittal and stamp or initial it with indication of action as appropriate. Prime Consultant will retain one copy or and furnish one copy to Contractor. Consultants will retain one copy.
2. Submittals returned marked "resubmit" or "rejected". Make corrections and resubmit.
    a. Direct specific attention on resubmittals to revision other than those requested by the Prime Consultant on previous submittals.
    b. Make shop drawing corrections on the original drawing and print.

3. Submittals returned with markings or comments and marked “confirm”. Submit a letter indicating acceptance of comments and stating that Contractor will comply with marks and comments.

4. Submittals returned marked “No Exceptions Taken”. Submit number of copies mechanical and electrical items with Contractor.

K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with provisions.

L. Submittal is not requested will not be recognized or processed.

1.05 CONSTRUCTION PROGRESS SCHEDULES

A. Submit as part of the Monthly Report required by the Owner-Contractor Agreement.

1.06 PROPOSED PRODUCTS LIST

A. Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.07 SHOP DRAWINGS

A. Present in a clear and thorough manner, accurately and at a scale sufficient to show pertinent aspects. Indicate fabrication, layout, anchorage and installation details.

B. Title each drawing. Identify details by reference to Contract Drawing and detail numbers.

C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Drawing Size: Minimum 8-1/2 inches by 11 inches and maximum 30 inches by 42 inches.

E. Shop Drawings: Submit review. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above.

1.08 PRODUCT DATA

A. Clearly mark each copy to identify each applicable product, model, option, and pertinent data for the products or systems to be provided. Supplement manufacturers' standard data to provide information unique to this Project.

B. Highlighting will not be acceptable.

C. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. After review distribute in accordance with the Submittal Procedures article above.

1.09 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

B. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Prime Consultant selection.

   1. Provide custom color samples where requested.

C. Reviewed samples which may be used in the Work are indicated in individual specification sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SCHEDULE OF SUBMITTALS

A. Product Data, Schedules, Shop Drawings and Other Printed Materials: Submit the number of copies which the Contractor requires, plus copies for the following:

   1. One copy: Prime Consultant.

   2. One copy: WHFD AND/OR PROJECT MANAGER.

   3. One copy: Hospital Construction Project Manager.

   4. Copies as required from consultants.

B. Samples: Submit the number of samples which the Contractor requires plus one for WHFD AND/OR PROJECT MANAGER and Contracts Manager.

Section No. - Title	Shop Drawings & Diagrams	Samples	Certifications (Materials, Treatment, Applicator, etc.)	Product Data, Manufacturer's Technical Literature	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment or Fixture Listing	Schedules (Project Installation)	Maintenance Service Contract	Field Posted As-built Drawings	Others	Guaranty or Warranty	Manufacturer's Guaranty or Warranty (Greater than one year)
01290 – Payment Procedures														■		
01310 – Project Management & Coordination														■		
1450 - Moisture Vapor Test			■				■	■								
01600 – Product Requirements														■		
01770 – Closeout Procedures	■	■	■	■			■		■			■	■	■	■	■
01783 – Project Record Documents				■						■	■		■	■		
03300 – Cast-In-Place Concrete	■		■	■			■							■		
05120 – Structural Steel Framing	■			■												
06160 – Sheathing				■			■									
06400 – Architectural Woodwork	■	■	■	■										■	■	
07213 – Building Insulation				■	■											
07242 – Direct-Applied Finish System	■	■		■			■							■	■	
07620 – Sheet Metal Flashing & Trim		■		■					■						■	
07841 – Penetration Firestopping			■	■			■							■	■	
07920 – Joint Sealants		■		■												
08113 – Hollow Metal Door Frames	■			■											■	

Section No. - Title	Shop Drawings & Diagrams	Samples	Certifications (Materials, Treatment, Applicator, etc.)	Product Data, Manufacturer's Technical Literature	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment or Fixture Listing	Schedules (Project Installation)	Maintenance Service Contract	Field Posted As-built Drawings	Others	Guaranty or Warranty	Manufacturer's Guaranty or Warranty (Greater than one year)
08210 – Wood Doors	■	■		■					■		■				■	■
08700 – Door Hardware	■		■	■			■		■		■			■	■	■
08830 - Mirrors	■		■	■			■		■					■	■	■
08900 - Louvers	■	■		■			■				■			■	■	
09110 – Non-Load Baring Wall Framing				■												
09265 – Gypsum Board Assemblies				■	■											
09511 – Acoustical Panel Ceiling		■		■					■						■	
09651 – Resilient Flooring		■		■					■		■			■	■	■
09720 – Wall Covering		■	■	■										■	■	
09900 - Painting		■	■	■	■						■			■		
10260 – Corner Guards		■		■	■				■		■			■	■	
10520 – Portable Fire Extinguisher & Cabinet				■						■					■	
10400 - Signage	■	■		■												
10810 – Toilet Accessories			■	■							■			■		
13281 – Removal & Disposal of Asbestos Containing Material	■	■		■			■	■		■	■			■		
13282 – Lead-Containing Paint Control Measures			■	■	■		■	■		■				■		
15000 – General Mechanical Requirements	■	■	■	■			■		■	■	■	■		■	■	
15070 – Mechanical	■			■		■				■				■	■	

Section No. - Title	Shop Drawings & Diagrams	Samples	Certifications (Materials, Treatment, Applicator, etc.)	Product Data, Manufacturer's Technical Literature	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment or Fixture Listing	Schedules (Project Installation)	Maintenance Service Contract	Field Posted As-built Drawings	Others	Guaranty or Warranty	Manufacturer's Guaranty or Warranty (Greater than one year)
Sound, Vibration & Seismic Control																
15080 – Mechanical Insulation			■	■						■					■	
15181 – Chilled Water Piping	■		■	■			■		■	■				■	■	
15300 – Wet Pipe Fire Sprinkler System	■			■		■									■	
15400 – Plumbing	■		■	■					■			■		■	■	
15405 – Medical Gas Systems	■		■	■					■					■	■	
15720 – Air Handling Units	■		■	■			■		■	■	■	■		■	■	
15810 – Ductwork & Ductwork Accessories	■		■	■			■		■		■	■		■	■	
15910 – Direct Digital Control Systems	■			■			■		■	■	■			■		
15950 – HVAC Testing/ Adjusting/ Balancing			■				■	■		■				■		
16010 – Basic Electrical Requirements	■			■										■		
16060 – Grounding & Bonding				■												
16073 – Hangers & Support for Electrical Systems				■												
16075 – Electrical Identification				■												
16120 – Conductors & Cables				■			■									
16130 – Raceways & Boxes	■			■												

Section No. - Title	Shop Drawings & Diagrams	Samples	Certifications (Materials, Treatment, Applicator, etc.)	Product Data, Manufacturer's Technical Literature	MSDS Sheets	Calculations	Reports (Testing, Maintenance, Inspection, etc.)	Test Plan	O & M Manual	Equipment or Fixture Listing	Schedules (Project Installation)	Maintenance Service Contract	Field Posted As-built Drawings	Others	Guaranty or Warranty	Manufacturer's Guaranty or Warranty (Greater than one year)
16140 – Wiring Devices				■												
16410 – Enclosed Switches				■												
16511 – Interior Lighting				■					■						■	
16700 – Communications				■										■		
16721 – Fire Alarm System	■		■	■						■				■	■	
16762 – Nurse Call System				■												

END OF SECTION

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quality assurance and control of installation.

B. Reference.

C. Inspection and testing laboratory services.

D. Special inspections.

E. Manufacturers' field services and reports.

1.02 RELATED SECTIONS

A. Section 01330 – Submittal Procedures.

B. Section 01600 – Product Requirements.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step-in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Prime Consultant before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.04 REFERENCES

A. Conform to reference standard by date of issue current on date for receiving bids.

B. Obtain copies of standards when required by Contract Documents.

C. Should specified reference standards conflict with Contract Documents, request clarification from Prime Consultant before proceeding.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 INSPECTION AND TESTING LABORATORY SERVICES

A. When the individual specifications sections require it, the Contractor shall appoint, employ, and pay for services of an independent firm to perform inspection and testing. Seismic testing will need to be performed by a special inspector. Contractor to coordinate inspection, but KCH will pay for said inspection directly. TAB to be arranged and paid for by the contractor at substantial completion or other date agreed upon by all parties.

B. Services will be performed in accordance with requirements of governing authorities and with specified standards.

C. Reports will be submitted by the independent firm to the Prime Consultant, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

D. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.

1. Notify WHFD AND/OR PROJECT MANAGER and independent firm 24 hours prior to expected time for operations required services.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

E. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by WHFD AND/OR PROJECT MANAGER and shall be paid by the Contractor.

1.06 SPECIAL INSPECTIONS

A. Owner will employ Special Inspectors acceptable to Hawaii County to perform inspection on certain elements of the work as required by the Building Code and its Amendments. During the course of the Work under inspection, each Special Inspector will submit detailed reports relative to progress and conditions of the

work including deviations from specified requirements and stipulating dates, times, and locations. Special inspector will submit a final report to the County, the Contractor and Prime Consultant. The Contractor shall cooperate fully with the Special Inspectors. The Contractor shall be responsible for scheduling of all inspections, including special inspections. The special inspector will send invoices directly to WHFD AND/OR PROJECT MANAGER.

B. The Hospital will perform and/or pay the fees for the following Special Inspections:

1. Seismic Inspection (if necessary).

2. Structural Inspection.

3. Fire stopping inspection.

C. All other Inspections shall be paid for by the Contractor.

1.07 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. Submit qualification of observer to the WHFD AND/OR PROJECT MANAGER 30 days in advance of required observations. Observer subject to approval of the Prime Consultant and the WHFD AND/OR PROJECT MANAGER.

B. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment or to test, adjust, and balance of equipment as applicable, and to initiate instruction when necessary.

C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written constructions.

D. Submit two (2) copies of report written by representative, both to the Owner and to the Project Engineer listing observations and recommendations, within five (5) days of observation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01450 - MOISTURE VAPOR & ALKALINITY TESTING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes additional administrative and procedural requirements for quality assurance.

B. Scope of Work

1. Provide concrete moisture vapor emission and alkalinity testing of all concrete scheduled to receive floor coverings, Portland cement toppings, Portland cement underlayments or resinous coatings.

2. Review each floor finish manufacturer's instructions for additional requirements pertaining to testing, tolerances, scheduling and distribution of test sites.

3. Test concrete placed below, on and above grade, and in accordance with the manufacturer's requirements.

4. Test all concrete surfaces scheduled to receive paint or coatings.

   a. Test existing concrete surfaces.

   b. Test new concrete surfaces, including patch areas such as concrete placed over trenches.

1.02 RELATED SECTIONS

A. Section 03300 - Cast-In-Place-Concrete.

B. Section 09651 - Resilient Flooring.

C. Section 09900 - Painting.

1.03 REFERENCES

A. ASTM F 1869 - Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

B. ASTM F 710 - Standard Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

1.04 SUBMITTALS

A. Testing Agency qualifications.

B. Report all test results in chart form listing test dates, start/stop time, start/stop weight, weight gain in grams, moisture vapor emission value and alkalinity levels.

C. List test locations on chart and show same on a site map, floor plan or other plan materials so that test locations are accurately known.

D. Deliver test results to the WHFD AND/OR PROJECT MANAGER and Prime Consultant.

1.05 QUALITY ASSURANCE

A. Independent Testing Agency or Manufacturer's Approved Contractor

1. Certified by Test Kit Manufacturer for product use.

2. Other agency with verifiable experience.

B. Commercially produced Moisture Vapor Emission Test Kits

1. Test dish including calcium chloride must be commercially packaged and delivered to test site in sealed factory wrapping.

2. Test done from same source as dish.

3. Test kit must comply with ASTM standards of size and weight.

C. Wide range pH paper, and distilled or de-ionized water.

1.06 ENVIRONMENTAL CONDITIONS

A. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than 1 nor more than 3 weeks prior to scheduled flooring installation.

B. Testing shall be in accordance with the manufacturer's requirements for each floor finish.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Calcium Chloride Test as manufactured by Vaprecision (800) 449-6194, or equal.

B. Alkalinity test paper as manufactured by Micro Essential Laboratory, or equal.

PART 3 - EXECUTION

3.01 QUANTIFICATION OF CONCRETE MOISTURE VAPOR EMISSION

A. Test concrete floors in accordance with ASTM F 1869.

B. The test site shall be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperatures and humidity levels shall be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions shall be 75+ 10 degrees F and 50+ 10 percent relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.

C. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 600 square feet and one per each additional 200 square feet. For slabs on grade, locate additional tests adjacent to penetrations and through slab joints at the rate of one per 200 square feet.

D. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials 24 hours prior to the placement of test kits.

E. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 gram. Record weight and start time.

F. Expose Calcium Chloride and set dish on concrete surface.

G. Install test containment dome and allow test to proceed for 60 - 72 hours.

H. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.

I. Weigh test dish on site recording weight and stop time.

J. Calculate and report results as “pounds of emission per 1,000 square feet per 24 hours”.

3.02 QUANTIFYING ALKALINITY LEVEL

A. Test concrete floors in accordance with ASTM F 710.

B. At each vapor emission test site, after removal of test containment dome, perform alkalinity test.

   1. Place several drops of water onto the concrete surface to form a puddle approximately one-inch in diameter.

   2. Allow the water to set for approximately 60 seconds.

   3. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine alkalinity reading.

C. Record and report all results.

END OF SECTION

SECTION 01500 - TEMPORARY FACILITIES & CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities may include, but not limited to, the following:

1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities, including toilets, wash facilities and drinking water facilities.
4. Electric power service.
5. Lighting.
6. Telephone service.

C. Support facilities include, but are not limited to, the following:

1. Project identification and temporary signs.
2. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities may include, but are not limited to, the following:

1. Environmental protection.
2. Storm water control.
3. Tree and plant protection.
4. Pest control.
5. Site enclosure fence.
6. Security enclosure and lockup.
7. Barricade, warning signs, and lights.
8. Fire protection.

1.02 RELATED DOCUMENTS

A. Refer to Drawings for additional requirements for temporary protection.

1.03 RELATED SECTIONS

A. Section 01330 – Submittal Procedures.

1.04 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when acceptable to WHFD AND/OR PROJECT MANAGER. Manager change over from use of temporary service to use of permanent service.

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.

2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

B. Water: Potable

2.02 EQUIPMENT

A. Fire Extinguishers: Hospital will provide fire extinguishers. Hand carried, portable, UL rated. Provide class and extinguishing agents as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

B. Self-Contained Toilet units, if necessary Single occupant units of chemical, aerated recirculation or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar non-absorbent material.

C. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110 to 120V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

D. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V AC, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to serve connections provided under the Work of the Project. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked0in services.

2. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

3. Install 50 amp 125/250v job box, if necessary.

4. Sewers and Drainage: If sewers are available, provide temporary connections

to remove effluent that can be discharged lawfully.

B. Water Service: Connect to existing water source for construction operations.

C. Sanitary Facilities: Existing designated facilities may be used during construction operations. Maintain daily in clean and sanitary condition,

D. Electric Power Service: Connect to existing power service. Power consumption shall not disrupt hospital's need for continuous service.

E. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.

3.03 SUPPORT FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulation and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Cooperate and comply with hospital's Environmental Management Plan.

B. Noise Control:

1. Obtain noise permit or permit as required by Chapter 43 State of Hawaii Department of Health regulations.

2. Muffle internal combustion engine powered equipment to minimize noise and properly maintain to reduce noise to acceptable levels.

3. Blasting and use of explosives will be not permitted.

4. Activities of severe and prolonged noise and vibration must be approved in advance by WHFD AND/OR PROJECT MANAGER. Submit written notice not less than seven days in advance of intended noise producing activity.

C. Dust Control:

1. Keep dust within acceptable levels at all times, including non-working hours, weekends and holidays, in conformance with Chapter 31 – Air Pollution of State Departments of Health, Public Health Regulations, latest editions.

2. Only wet grinding or cutting of concrete will be allowed on exterior surfaces.

3. Mechanical dry sweeping not permitted. Vacuuming, wet mopping, approved

limited dry hand, wet or damp sweeping is acceptable utilizing the hospital's EPA approved disinfectant.

4. During loading operations, water down debris and waste materials to allay dust.
5. Air scrubbers utilized for dust control costs incurred are the responsibility of the Contractor.
6. Use wet/sticky mats at all entrances to work area to control dust. Replace daily at a minimum.
7. The Contractor is responsible for damage claims.
8. ICRA – during construction/renovation – KCH Policy 125.54 must be adhered to.

D. Hazardous materials:

1. Asbestos, urea formaldehyde and other hazardous materials are not expected but may be present in the existing structures subject to alteration. Observe the applicable requirements of Hawaii Occupational Safety and health Standards and the Environmental Protection Agency.
2. If the presence of toxic substances is determined, notify the WHFD AND/OR PROJECT MANAGER immediately to determine the next course of action.
3. Do not begin demolition when toxic substances are present until occupants of the building are moved to other facilities or are separated from the exposure by assured means.
4. In removing and disposing of toxic substances, observe the following requirements:
    a. Provide air-tight compartments within which the toxic substances may be removed.
    b. In lieu of air0tight compartments, provide competent controlled misting or dust settling agent.
    c. Place toxic substances in properly labeled sacks of at least 8 mil polypropylene.

5. Must adhere to KCH Hazmat Material and Waste Management Program Policy 122-6 and Cleanup of Spills, Hazardous and Infectious Policy 122-6-2. (If any differences are discovered between RFP and KCH policies, KCH policies shall prevail.)

E. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Hospital will provide fire extinguishers.

    a. Field Offices: Class A stored-pressure water-type extinguishers.

    b. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposed areas.

4. Supervise welding operations, and similar sources of fire ignition.

5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedure to be followed. Instruct personnel in methods and procedures. Post warnings and information.

F. Barriers

1. Follow ICRA. Provide barriers to prevent unauthorized entry to construction areas, to allow for hospital’s use of premises, and to protect existing facilities and adjacent properties from damage from construction operations.

2. Provide barricades and covered walkways required by governing authorities.

3. Protect non-owned vehicular traffic, store materials, site and structures from damage.

4. Barriers that will be used on project are to be approved by the project manager before starting work.

G. Interior Enclosures

1. Provide temporary partitions as required to separate work areas from hospital occupied areas, to prevent penetration of dust and moisture into hospital occupied areas, and to prevent damage to existing materials and equipment.

2. Construction: Framing and sheet materials must be noncombustible, with closed joints and sealed edges at intersections with existing surfaces and all other areas to provide a smoke tight area; STC rating of 35 in accordance with ASTM E90 and maximum Flame Spread Rating of 75 in accordance with ASTM E84. This information must be posted on the containment.

3. Paint surfaces exposed to view from hospital occupied areas.

4. Enclosures that will be used on the project are to be approved by the WHFD AND/OR PROJECT MANAGER before starting work.

H. Infection Control

1. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with hospital's infection control regulation and minimize undesirable effects.

a. For ICRA. Cooperate and comply with Owner's Infection Control Plan (KCH Infection Control, Policy 125-54, to be adhered to during construction and renovation.).

3.04 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended use.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

END OF SECTION

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Selection of products for use in project

B. Product delivery, storage, and handling

C. Manufacturers standard warranties on products; special warranties

D. Product substitutions

E. Comparable products

1.02 RELATED SECTIONS

A. Section 01330 – Submittal Procedures.

B. Section 01400 – Quality Requirements.

C. Section 01770 – Closeout Procedures.

D. Section 01732 – Cutting & Patching.

1.03 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, except that products consisting of recycled- content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

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 Hospital.

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 Hospital.

1.04 SUBMITTALS

A. Product List: Submit a list, in tabular from (preferably in Microsoft Excel), showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. 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 20 days after date of commencement of the Work, submit electronically the 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 30 days after date of commencement of the Work, submit electronically the completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.

5. Project Prime Consultant's or WHFD AND/OR PROJECT MANAGER's Action: The Project Prime Consultant or WHFD AND/OR PROJECT MANAGER will respond in writing to Contractor within 15 days of receipt of completed product list. The Project Prime Consultant's or WHFD AND/OR PROJECT MANAGER's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Project Prime Consultants or WHFD AND/OR PROJECT MANAGERs response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01330 - Submittal Procedures. Show compliance with requirements.

1.05 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.

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, the WHFD AND/OR PROJECT MANAGER will determine which products shall be used.

1.06 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 manufacturers written instructions.

1. Schedule delivery to minimize storage at Project site and to prevent overcrowding of construction spaces. Long term storage onsite is not permitted unless approved by WHFD AND/OR PROJECT MANAGER.

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 weather-tight 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

B. Storage: Provide a secure location and enclosure at Project site for temporary storage of materials and equipment. Coordinate location with WHFD AND/OR

PROJECT MANAGER. Long term storage onsite is not permitted unless approved by WHFD AND/OR PROJECT MANAGER.

1.07 PRODUCT WARRANTIES

A. 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. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.

3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01770 - Closeout Procedures.

PART 2 - PRODUCTS

2.01 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. Hospital 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 “match sample,” sample to be matched is Prime Consultant’s.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics” of products.

6. 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 manufacturer 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
9. subparagraphs titled “Basis-of-Design Product[s] 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.
10. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Prime Consultant’s sample. WHFD AND/OR PROJECT MANAGER’s or Contract Manager’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.
11. 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, WHFD AND/OR PROJECT MANAGER and Contracts Manager 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. WHFD AND/OR PROJECT MANAGER and Contracts Manager will select color, pattern, or texture from manufacturer’s product line that includes both standard and premium items.

12. Allowances: Refer to individual Specification Sections and “Allowance” provisions in Division I for allowances that control product selection and for procedures required for processing such selections.

2.02 PRODUCT SUBSTITUTIONS

A. Follow the procedures as described in Hawaii Health Systems Corporation General Conditions for Construction.

2.03 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 Prime Consultants and owners, if requested.

5. Samples, if requested.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01715 - EXISTING CONDITIONS – HAZARDOUS MATERIALS SURVEY

PART 1 - GENERAL

1.01 SUMMARY

A. The Hospital commissioned a Report titled "*Limited Hazardous Materials Survey Kona Community Hospital"* – located at 79-1019 Haukapila Street, Kealakekua, Hawaii Island, Hawaii, dated December 16, 2019. The survey area was limited to the electrical room wall that will be affected by the Ultrasound project. The Report was prepared by EnviroServices & Training Center, LLC.

B. Related Sections include the following:

1. Section 13281 – Removal and Disposal of Asbestos-Containing Materials.
2. Section 13282 – Lead-Containing Paint Control Measures.
3. Section 13288 – Testing/Air Monitoring.

1.02 ASBESTOS-CONTAINING MATERIALS

A. The structure to be modified under this contract was surveyed for the presence of asbestos-containing materials (ACM). A copy of the initial survey report, as well as any subsequent supplemental survey reports, if performed, is included in the Section.

1. The Contractor may perform further surveys at its own expense if ACM not shown in the reports is suspected in the areas in which work will be performed. If ACM is found, notify the Prime Consultant immediately.
2. If there is ACM outside of the areas in which work will be performed, this ACM shall not be disturbed in any way.

B. If applicable, the Contractor shall notify his/her employees, subcontractors and all other persons engaged in the demolition and abatement work of the presence of asbestos in accordance with the requirements of Chapter 110, Article 12-110-2 (f) (1) (B) of the Occupational Safety and Health Standards, State of Hawaii.

C. In the event that work is required in any area on the site other than those designated in the project scope, the Contractor shall request copies of the

asbestos survey reports for each such area from the Engineer. Based on the information contained in the additional survey(s), notify all persons on the project as indicated in paragraph 1.2 B.

1.03 LEAD-CONTAINING PAINT

A. Inform employees, Subcontractors and all other persons engaged in the project that lead containing paint (LCP) is present in the existing building and at the job site. Follow the requirements of Title 12 (Department of Labor and Industrial Relations), Subtitle 8 (Division of Occupational Safety and Health), Chapter 148 (Lead Exposure in Construction), Hawaii Administrative Rules.

B. Review the attached lead testing data which identifies the locations LCP was found. Lead testing was for design purposes only and the results **do not satisfy** any of the requirements of HIOSH Chapter 12-148.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SURVEY (ATTACHED)

A. Limited Hazardous Materials Survey Report, Kona Community Hospital located at 79-1019 Haukapila Street, Kealakekua, Hawaii Island, Hawaii, dated December 16, 2019, prepared by EnviroServices & Training Center, LLC.

END OF SECTION

LIMITED HAZARDOUS MATERIALS SURVEY REPORT

KONA COMMUNITY HOSPITAL
79-1019 HAUKAPILA STREET, KEALAKEKUA, HAWAII

Prepared for:
ERSKINE ARCHITECTS, INC.
540 Lagoon Drive, Suite 4
Honolulu, Hawaii 96819

Prepared by:
ENVIROSERVICES & TRAINING CENTER, LLC
505 Ward Avenue, Suite 202
Honolulu, Hawaii 96814
tel: (808) 839-7222

ETC Project No. 19-4020

December 16, 2019

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APPENDICES

1.0 CERTIFICATIONS AND LIMITATIONS

EnviroServices & Training Center, LLC (ETC) has completed a Limited Hazardous Materials Survey (Survey) of the Kona Community Hospital, located at 79-1019 Haukapila Street, Kealakekua, Hawaii (Subject Site). ETC's findings and recommendations contained herein are based on site observations, government regulations and laboratory data, which were gathered at the time and location of the study. Opinions stated in this report do not apply to changes that may have occurred after the services were performed.

ETC has performed specified services for this project with the degree of care, skill and diligence ordinarily exercised by professional consultants performing the same or similar services. No other warranty, guarantee, or representation, expressed or implied, is included or intended; unless otherwise specifically agreed to in writing by both ETC and ETC's Client.

This report is intended for the sole use of Erskine Architects, Inc. exclusively for the Subject Site. Erskine Architects Inc. may use and release this report, including making and retaining copies, provided such use is limited to the particular site and project for which this report is provided. However, the services performed may not be appropriate for satisfying the needs of other users. Release of this report to third-parties will be at the sole risk of ETC's Client and/or said user, and ETC shall not be liable for any claims or damages resulting from or connected with such release or any third party's use or reuse of this report.

Prepared and
Surveyed By: 

Sara Marvin
State of Hawaii Asbestos Building Inspector # HIASB-4361
State of Hawaii Lead Building Inspector # PB-0973

2.0 EXECUTIVE SUMMARY

EnviroServices & Training Center, LLC (ETC) conducted a Limited Hazardous Materials Survey (Survey) of the Kona Community Hospital located in Kealakekua, Hawaii (Subject Site). The Survey was limited to the Electrical Room wall, as specified to ETC by documents provided by Erskine Architects, Inc.

2.1 Summary of Asbestos Survey

Laboratory analysis determined that the joint compound and wall texture were found to contain asbestos above the regulatory limit of 1%.

2.2 Summary of Lead Paint Survey

Laboratory analysis determined that the Beige/Off-White paint was found to contain lead below the Environmental Protection Agency (EPA)/United States Department of Housing and Urban Development (HUD) guideline of 5,000 mg/kg by weight, but above the laboratory detection limit, classifying it as Lead-Containing Paint (LCP).

3.0 INTRODUCTION/PURPOSE

The purpose of this Survey was to inspect the Subject Site for the presence of asbestos-containing material and lead-based and lead-containing paint. The Survey was conducted on October 16, 2019. Specifically, ETC completed the following tasks:

- Performed site reconnaissance at the Subject Site;
- Collected three (3) samples of suspected Asbestos-Containing Material (ACM) from the Subject Site;
- Submitted the 3 samples of suspected ACM to EMC Labs, Inc. (EMC) for analysis of asbestos via Polarized Light Microscopy (PLM) in accordance with the Environmental Protection Agency (EPA) Method 600/R-93/116;
- Collected one (1) composite paint chip sample from the Subject Site;
- Submitted the 1 composite paint chip sample to EMC for analysis by flame atomic absorption spectroscopy (FAAS) via EPA Method 7082 for total lead content; and
- Prepared this report documenting the field activities and the results of the investigation including analytical results, conclusions, and recommendations.

4.0 METHODOLOGY

4.1 Asbestos

ETC personnel collected 3 samples of suspected ACM for asbestos analysis. Samples were collected from various areas of the Subject Site in accordance with EPA guidelines and recommendations.

The suspected ACM were wetted with amended water before sample collection. A small piece was then carefully cut out and placed into a labeled, re-sealable plastic bag. The sampling equipment was cleaned between each sample collection to avoid cross-contamination between samples. The approximate quantity of each suspected ACM was noted. Sample locations were randomly selected in accordance with EPA protocols and recommendations.

Samples were properly logged and recorded following strict chain-of-custody procedures, and sent to EMC located in Phoenix, Arizona, for analysis by PLM in accordance with EPA Method 600/R-93/116. EMC is accredited for bulk asbestos analysis through successful participation in the National Voluntary Lab Accreditation Program (NVLAP).

4.2 Lead Paint

ETC personnel collected 1 composite paint chip sample and had it analyzed in accordance with the EPA guidelines and recommendations.

The suspected lead-containing paint was wetted with amended water before sample collection. Paint was carefully scraped and placed into a labeled re-sealable plastic bag. The sampling equipment was cleaned between each sample collection to avoid cross-contamination between samples. The sample was properly logged and recorded following strict chain of custody procedure and submitted to EMC for analysis by FAAS, in accordance with EPA Method 7082. EMC is an Environmental Lead Laboratory Accreditation Program (ELLAP)-accredited laboratory.

5.0 RESULTS

5.1 Asbestos

Laboratory analysis determined that the white joint compound and wall texture located on the sampled drywall material was found to contain asbestos above the regulatory limit of 1%.

One (1) sample contained glass fibers. Although materials containing such fibers are not specifically regulated, it is ETC's recommendation to handle materials containing glass fibers with appropriate protective equipment.

The asbestos analytical laboratory report is included in Appendix I. Data Tables of all sampled materials are included in Appendix II. Photo Documentation is included in Appendix III.

5.2 Lead Paint

Laboratory analysis determined that none of the paint sampled was found to contain lead above the Environmental Protection Agency (EPA)/United States Department of Housing and Urban Development (HUD) guideline of 5,000 mg/kg by weight.

Laboratory analysis determined that the Beige/Off-White composite paint sample contain was found to contain lead above the laboratory detection limit of 10 mg/kg by weight, classifying it as Lead-Containing Paint (LCP).

The lead analytical laboratory report is included in Appendix I. Data Tables of all sampled materials are included in Appendix II. Photo Documentation is included in Appendix III.

6.0 DISCUSSION AND RECOMMENDATIONS

The findings and recommendations of ETC's limited hazardous material survey extended only to those areas that were accessible at the time of the site reconnaissance. Any areas that were inaccessible either due to physical restraints (i.e. areas within walls, excessive heights, hidden materials, etc.) are not covered under the scope of this survey and should be evaluated for hazardous materials separately prior to any disturbance.

Based on ETC's visual inspection of the facility and laboratory data, ETC recommends the following:

- Manage and/or remove and dispose of hazardous and regulated materials in accordance with applicable federal, state, and local regulations, prior to renovation and/or demolition activities that may disturb these materials.
- Any material that is suspected to contain a hazardous contaminant but was not tested as part of this survey should be tested prior to disturbance.
- All ACM must be removed and disposed of by a qualified asbestos abatement contractor.
- Handle materials containing glass fibers with appropriate protective equipment to prevent inhalation or ingestion of fibers and contact with skin and mucous membranes.
- Remove and dispose of (abate) all loose and flaking (deteriorated) lead-containing paint (LCP) that may be disturbed during renovation/demolition activities in accordance with applicable federal, state, and local regulations.
- All LCP waste and debris generated from the removal must either be recycled in accordance with applicable regulatory requirements, where available (e.g. metal components), or undergo Toxicity Characteristic Leaching Procedure (TCLP)-Lead analysis prior to disposal.
- Treat all LCP that is to remain at the facility in a manner that will prevent a lead paint hazard. Such treatments may include but are not limited to, paint stabilization, encapsulation, and enclosure.
- The services of a qualified consultant should be obtained to monitor and inspect the removal activities to ensure compliance with applicable EPA, OSHA, and HIOSH regulations pertaining to the handling of ACM and LCP.
- Conduct air monitoring for asbestos fibers and lead particulates by qualified personnel during abatement and general renovation/demolition activities of any areas that were determined to contain these contaminants.

Appendix I

LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY FORMS

EMC LABS, INC.

9830 S. 51st Street, Suite B109, Phoenix, AZ 85044
Phone: 800-362-3373 or 480-940-5294 - Fax: (480) 893-1726

Laboratory Report
0230454

Bulk Asbestos Analysis by Polarized Light Microscopy

NVLAP#101926-0

Client:	ENVIROSERVICES & TRAINING CENTER	Job# / P.O. #:	19-4020
Address:	505 WARD AVE, STE 202	Date Received:	12/09/2019
	HONOLULU HI 96814	Date Analyzed:	12/13/2019
Collected:	10/16/2019	Date Reported:	12/13/2019
Project Name:	ERSKINE KONA HOSPITAL	EPA Method:	EPA 600/R-93/116
Address:		Submitted By:	JAMES DOLAN
		Collected By:	

Lab ID / Client ID	Sample Location	Layer Name / Sample Description	Asbestos Detected	Asbestos Type	(%)	Non-Asbestos Constituents	
0230454-001 791019-A01	PROPOSED LAB SPACE	LAYER 1 Drywall, White/ Brown	No	None Detected		Cellulose Fiber Fibrous Glass Gypsum Carbonates Mica	10% 2% 88%
		LAYER 2 Joint Compound, White	Yes	Chrysotile	3%	Cellulose Fiber Carbonates Mica Quartz	1% 96%
		LAYER 3 Tape, White	No	None Detected		Cellulose Fiber Carbonates	98% 2%
		LAYER 4 Texture, White/ Beige	Yes	Chrysotile	3%	Carbonates Mica Quartz Binder/Filler	 97%
0230454-002 791019-A02	PROPOSED LAB SPACE	LAYER 1 Drywall, White/ Brown Note: *Not analyzed per client request					
		LAYER 2 Texture/ Paint, White/ Beige Note: *Not analyzed per client request					

EMC LABS, INC.

9830 S. 51st Street, Suite B109, Phoenix, AZ 85044
Phone: 800-362-3373 or 480-940-5294 - Fax: (480) 893-1726

Laboratory Report
0230454

Bulk Asbestos Analysis by Polarized Light Microscopy

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Collected:	10/16/2019	Date Reported:	12/13/2019
Project Name:	ERSKINE KONA HOSPITAL	EPA Method:	EPA 600/R-93/116
Address:		Submitted By:	JAMES DOLAN
		Collected By:	

Lab ID Client ID	Sample Location	Layer Name / Sample Description	Asbestos Detected	Asbestos Type (%)	Non-Asbestos Constituents
0230454-003 791019-A03	PROPOSED LAB SPACE	LAYER 1 Drywall, White/ Brown Note: *Not analyzed per client request LAYER 2 Joint Compound, White Note: *Not analyzed per client request LAYER 3 Tape, White Note: *Not analyzed per client request LAYER 4 Texture, White/ Beige Note: *Not analyzed per client request			

Analyst - Kenneth Scheske

Signatory - Lab Director - Kurt Kettler

CHAIN OF CUSTODY

EMC Labs, Inc.
9830 S. 51st St., Ste B-109
Phoenix, AZ 85044
(800) 362-3373 Fax (480) 893-1726

LAB#: 230454
TAT: 3-5day
Rec'd: DEC 09 P.M.

COMPANY NAME:	ENVIROSERVICES & TRAINING CENTER, LLC	BILL TO:	(If Different Location)
	505 Ward Ave. Suite #202		
	Honolulu, HI 96814		
CONTACT:	Antone Gabriel, Sara Marvin, James Dolan, Jasmin Sahib		
Phone/Fax:	(808) 839-7222 ext 232/(808) 839-4455		
Email:	agabriel@gotoetc.com, jdolan@gotoetc.com, jsahib@gotoetc.com, smarvin@gotoetc.com,		

Now Accepting: VISA – MASTERCARD **Price Quoted: $ _____ / Sample $_____ / Layers**

COMPLETE ITEMS 1-4: (Failure to complete any items may cause a delay in processing or analyzing your samples)

1. TURNAROUND TIME: [Same Day RUSH] [1-Day] [2-Day] [3-4-5 Day] [6-10 Day]

****Prior confirmation of turnaround time is required**
****Additional charges for rush analysis (please call marketing department for pricing details)**
****Laboratory analysis may be subject to delay if credit terms are not met**

2. TYPE OF ANALYSIS: [Bulk-PLM] [Air-PCM] [Lead] [Point Count] [Fungi: AOC, W-C, Bulk, Swab, Tape]

3. DISPOSAL INSTRUCTIONS: [Dispose of samples at EMC] / [Return samples to me at my expense]

(If you do not indicate preference, EMC will dispose of samples 60 days from analysis.)

4. Project Name: Erskine Kona Hospital **Project Number:** 19-4020

EMC SAMPLE #	CLIENT SAMPLE #	DATE & TIME SAMPLED	LOCATION/MATERIAL TYPE	Samples Accepted Yes / No
1	791019-A01	10/16	Proposed Lab Space – Drywall/Joint Compound	Y N
2	791019-A02	10/16	Proposed Lab Space – Drywall/Joint Compound	Y N
3	791019-A03	10/16	Proposed Lab Space – Drywall/Joint Compound	Y N
				Y N
				Y N
				Y N
				Y N
				Y N
				Y N
				Y N
				Y N

SPECIAL INSTRUCTIONS: STOP AT FIRST POSITIVE

Sample Collector: (Print) James Dolan (Signature) _____ 915

Relinquished by James Dolan Date/Time: 12/6/19 Received by: Diana Federico Date/Time: 12/9/19

Relinquished by: Diana Federico Date/Time: 12/9/19 445pm Received by: _____ Date/Time: 12/9/19 1645

Relinquished by: _____ Date/Time _____ Received by: _____ Date/Time: _____

** In the event of any dispute between the above parties for these services or otherwise, parties agree that jurisdiction and venue will be in Phoenix, Arizona and prevailing party will be entitled to attorney's fees and court costs.

Rev. 09/27/08

EMC LABS, INC.

9830 South 51st Street, Suite B-109 / PHOENIX, ARIZONA 85044 / 480-940-5294 or 800-362-3373 / FAX 480-893-1726
emclab@emclabs.com

LEAD (Pb) IN PAINT CHIP SAMPLES

EMC SOP METHOD #L01/1 EPA SW-846 METHOD 7420

EMC LAB #:	L78206	**DATE RECEIVED:**	12/09/19
CLIENT:	Enviroservices & Training Center, LLC	**REPORT DATE:**	12/13/19
		DATE OF ANALYSIS:	12/12/19
CLIENT ADDRESS:	505 Ward Ave. Suite #202 Honolulu, HI 96814	**P.O. NO.:**	
PROJECT NAME:	Erskine Kona Hospital	**PROJECT NO.:**	19-4020

EMC # L78206-	SAMPLE DATE /19	CLIENT SAMPLE #	DESCRIPTION	REPORTING LIMIT (%Pb by weight)	%Pb BY WEIGHT
1	10/16	791019-L01	Proposed Lab Space – Beige/Off White Paint	0.010	0.013

^ = Dilution Factor Changed ***** = Excessive Substrate May Bias Sample Results **BRL** = Below Reportable Limits **#** = Very Small Amount Of Sample Submitted, May Affect Result

This report applies to the standards or procedures identified and to the samples tested only. The test results are not necessarily indicative or representative of the qualities of the lot from which the sample was taken or of apparently identical or similar products, nor do they represent an ongoing quality assurance program unless so noted. Unless otherwise noted, all quality control analyses for the samples noted above were within acceptable limits.

Where it is noted that a sample with excessive substrate was submitted for laboratory analysis, such analysis may be biased. The lead content of such sample may, in actuality, be greater than reported. EMC makes no warranty, express or implied, as to the accuracy of the analysis of samples noted to have been submitted with excessive substrate. Resampling is recommended in such situations to verify original laboratory results. EMC Labs, Inc. (ID 101586) is accredited by the AIHA Laboratory Accreditation Programs, LLC (AIHA-LAP, LLC) in the Environmental Lead accreditation program(s) for Paint, Settled Dust by Wipe, Soil and Airborne Dust Fields of Testing as documented by the Scope of Accreditation Certificate and associated Scope. AIHA-LAP, LLC accreditation complies with the ISO/IEC Standard 17025:2005. requirements.

ANALYST: Jason Thompson

QA COORDINATOR: Kurt Kettler

Rev. 11/30/08

CHAIN OF CUSTODY

EMC Labs, Inc.
9830 S. 51st St., Ste B-109
Phoenix, AZ 85044
(800) 362-3373 Fax (480) 893-1726

LAB#: Z78206
TAT: 3-5 days
Rec'd: 12/9/19

COMPANY NAME:	ENVIROSERVICES & TRAINING CENTER, LLC	BILL TO:	(If Different Location)
	505 Ward Ave. Suite #202		
	Honolulu, HI 96814		
CONTACT:	Antone Gabriel, Sara Marvin, James Dolan, Jasmin Sahib		
Phone/Fax:	(808) 839-7222 ext 232/(808) 839-4455		
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Now Accepting: **VISA – MASTERCARD** **Price Quoted: $ _____ / Sample $_____ / Layers**

COMPLETE ITEMS 1-4: **(Failure to complete any items may cause a delay in processing or analyzing your samples)**

1. TURNAROUND TIME: [Same Day RUSH] [1-Day] [2-Day] [3-4-5 Day] [6-10 Day]

****Prior confirmation of turnaround time is required**
****Additional charges for rush analysis (please call marketing department for pricing details)**
****Laboratory analysis may be subject to delay if credit terms are not met**

2. TYPE OF ANALYSIS: [Bulk-PLM] [Air-PCM] [Lead] [Point Count] [Fungi: AOC, W-C, Bulk, Swab, Tape]

3. DISPOSAL INSTRUCTIONS: [Dispose of samples at EMC] / [Return samples to me at my expense]
(If you do not indicate preference, EMC will dispose of samples 60 days from analysis.)

4. Project Name: Erskine Kona Hospital **Project Number:** 19-4020

EMC SAMPLE #	CLIENT SAMPLE #	DATE & TIME SAMPLED	LOCATION/MATERIAL TYPE	Samples Accepted Yes / No
1	791019-L01	10/16	Proposed Lab Space – Beige/Off White paint	Y N
				Y N
				Y N
				Y N
				Y N
				Y N
				Y N
				Y N
				Y N
				Y N
				Y N

SPECIAL INSTRUCTIONS: _____

Sample Collector: (Print) James Dolan (Signature) _____ 9/5

Relinquished by James Dolan Date/Time: 12/6/19 Received by: _____ Date/Time: 12/9/19

Relinquished by: _____ Date/Time: 12/9/19 Received by: _____ Date/Time: 12/9/19 1200

Relinquished by: _____ Date/Time _____ Received by: _____ Date/Time: _____

** In the event of any dispute between the above parties for these services or otherwise, parties agree that jurisdiction and venue will be in Phoenix, Arizona and prevailing party will be entitled to attorney's fees and court costs.

Rev. 09/27/08

Appendix II

DATA TABLES

Table 1
Asbestos Survey Results
Kona Community Hospital

Sample ID	Sample Location	Material	Condition	Category	Friability	Analysis Layer	Asbestos Content	Estimated Quantity
791019-A01	Electrical Room Wall	Drywall	Damaged	Misc.	Friable	Drywall	None*	**Approx. 100 sq. ft**
						Joint Compound	**3% Chrysotile**	
						Tape	None	
						Wall Texture	**3% Chrysotile**	
791019-A02						Not Analyzed	N/A	N/A
791019-A03						Not Analyzed	N/A	N/A

* = Contains Glass Fibers

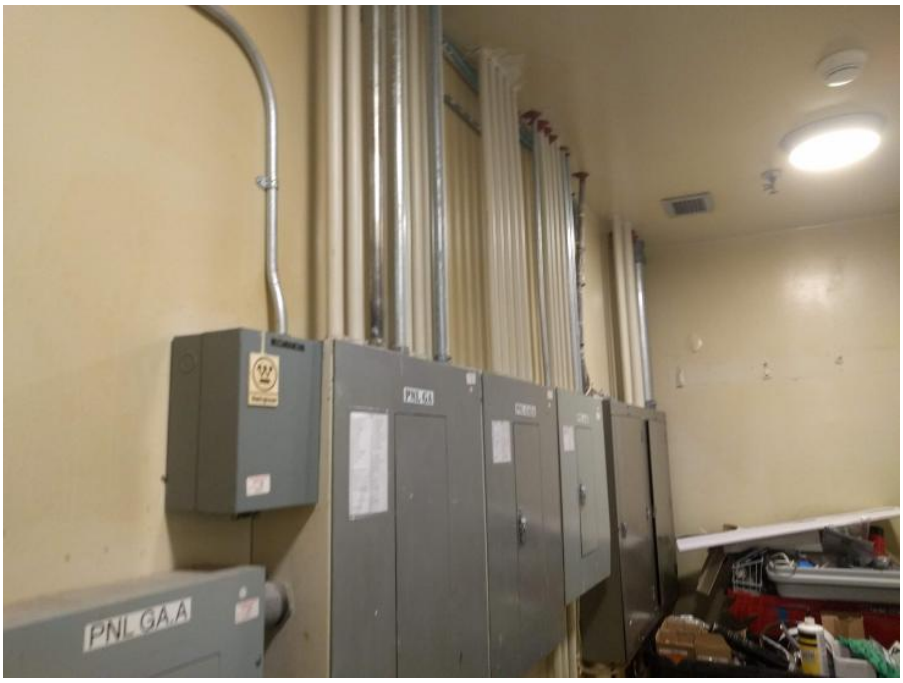
Table 1
Lead Paint Survey Results
Kona Community Hospital

Sample ID	*Interior/ Exterior*	*Location*	*Paint Color*	*Substrate*	*Description*	*Condition*	*Reporting Limit (mg/kg)*	*Results (mg/kg)*
791019-L01	Interior	Electrical Room Wall	Beige/Off-White	Drywall	Composite Paint Sample	Fair	10	13

Appendix III

PHOTOGRAPHIC DOCUMENTATION

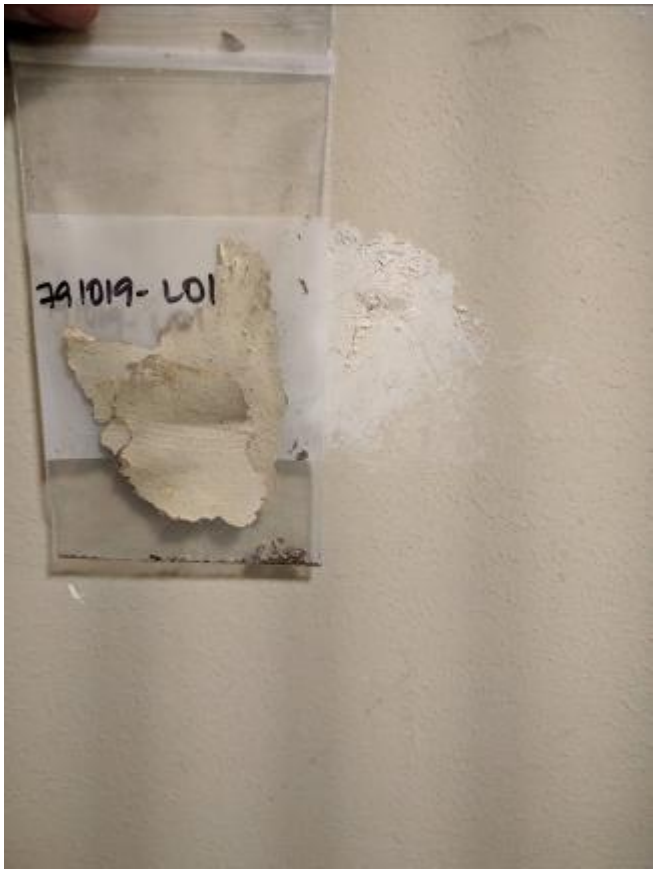
ASBESTOS



Photograph 01: Electrical Room wall.

Photograph 02: Sampled drywall with joint compound & wall texture.
Sample ID: 791019-A01

LEAD



Photograph 03: Beige/Off-White lead-containing paint.
Sample ID: 791019-L01

SECTION 01730 – EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Construction layout.

B. Field engineering and surveying.

C. Progress cleaning.

1.02 RELATED SECTIONS

A. Section 01330 – Submittal Procedures.

B. Section 01770 – Closeout Procedures.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Acceptance of Conditions: Examine substrates, areas, and conditions, with General Contractor and Subcontractor 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.

3.02 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

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.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Prime Consultant. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.03 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.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.

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, wet mop or vacuum the entire work area, as appropriate, utilizing the hospital's EPA approved disinfectant.

D. 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.

E. 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.

END OF SECTION

SECTION 01732 - CUTTING & PATCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements and limitations for cutting and patching of Work.

1.02 RELATED SECTIONS

A. Section 01100 - Summary of Work.

B. Section 01120 – Alteration Project Procedures.

C. Section 01330 – Submittal Procedures.

D. Section 01600 – Product Requirements.

E. Section 07841 – Penetration Firestopping.

F. Individual Product Specification Sections:

1. Cutting and patching incidental to work of the Section.
2. Advance notification to other Sections of openings required in work of those Sections.
3. Limitations on cutting structural members.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Primary Products: Those required for original installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing work, inspect conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas that may be exposed by uncovering work.

C. Maintain excavations free of water.

3.03 CUTTING AND PATCHING

A. Execute cutting, fitting, and patching to complete work.

B. Fit products together to integrate with other work.

C. Uncover work to install ill-timed work.

D. Remove and replace defective or non-conforming work.

E. Remove samples of installed work for testing when requested.

F. Provide openings in the work for penetration of mechanical and electrical work.

3.04 PERFORMANCE

A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

B. Cut rigid materials using masonry saw or core drill. Pneumatic tools are allowed with WHFD's prior approval.

C. Restore work with new products in accordance with requirements of Contract Documents.

D. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

E. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids, fire stopping, to full thickness of the penetrated element. See Section 07841 – Penetration Firestopping.

F. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

1.02 RELATED SECTIONS

A. Section 01260 - Contract Considerations.

B. Section 01730 - Execution Requirements.

C. Section 01310 – Project Management & Coordination.

D. Section 01290 - Payment Procedures.

E. Section 01600 – Product Requirements.

F. Section 01783 – Project Record Documents.

G. Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.03 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 Hospital Risk Manager of pending insurance changeover requirements, if necessary.
3. Obtain and submit releases permitting Hospital unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating

certificates, and similar releases.

4. 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.
5. Complete startup testing of systems.
6. Submit test/adjust/balance, including TAB, records.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Advise WHFD AND/OR PROJECT MANAGER of changeover in heat and other utilities.
9. Submit changeover information related to Hospital's occupancy, use, operation, and maintenance.
10. Complete final cleaning requirements, including touchup painting.
11. 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, the WHFD AND/OR PROJECT MANAGER will either advise the Prime Consultant to proceed with inspection or notify Contractor of unfulfilled requirements. Upon request from the WHFD AND/OR PROJECT MANAGER, the Prime Consultant 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 the WHFD AND/OR PROJECT MANAGER that must be completed or corrected before the certificate will be issued.

1. Re-inspection: Request re-inspection 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.

1.04 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 Section 01290 - Payment Procedures.

2. Submit warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents. To be submitted in 3 ring binder.

3. Submit operation and maintenance manuals. To be submitted in a 3 ring binder.

4. Deliver tools, spare parts, extra materials, and similar items to location designated by WHFD AND/OR PROJECT MANAGER. Label with manufacturer's name and model number where applicable.

5. Make final changeover of permanent locks and deliver keys to WHFD AND/OR PROJECT MANAGER. Advise Hospital's personnel of changeover in security provisions.

6. Submit copy of WHFD AND/OR PROJECT MANAGER's Substantial Completion inspection list of items to be completed or corrected. The copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

8. Instruct Hospital's personnel in the operation, adjustment, and maintenance of products, equipment, and systems. Document attendance and discussion topics presented to WHFD AND/OR PROJECT MANAGER's personnel.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, the Prime Consultant and WHFD AND/OR PROJECT MANAGER will either proceed with inspection or notify Contractor of unfulfilled requirements.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.05 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit electronic copy of punch 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. Use Contractor's form.

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 Contractor.

d. Page number.

1.06 WARRANTIES

A. Submittal Time: Submit written warranties on request of WHFD AND/OR PROJECT MANAGER for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 10 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. 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-I 1-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.

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

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Cleaning agents must be approved WHFD AND/OR PROJECT MANAGER. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

3.01 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 as well as utilize hospital approved disinfectants.

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. 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.

f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

g. Sweep concrete floors broom clean in unoccupied spaces. Mop using quaternary ammonium disinfectants.

h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

i. 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.

j. Remove labels that are not permanent.

k. 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.

    i. Do not paint over “UL” and similar labels on doors, door frames, windows and window frames, including mechanical and electrical nameplates. If “UL” and similar labels are painted over, the Contractor will need to replace the assemblies.

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

m. Replace parts subject to unusual operating conditions.

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

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

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

q. 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.

r. Leave Project clean and ready for occupancy.

C. Pest Control: To be determined by WHFD AND/OR PROJECT MANAGER.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Hospital's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully. Follow County of Hawaii waste guidelines.

END OF SECTION

SECTION 01783 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

1.02 RELATED SECTIONS

A. Section 01770 - Closeout Procedures.

B. Related sections of the work in this Specification for Project Record Documents.

1.03 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one set of plots from corrected Record CAD Drawings and one set of marked-up Record Prints. Prime Consultant will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Prime Consultant will return plots and prints for organizing into sets, printing, binding, and final submittal.

b. Final Submittal: Submit one set of marked-up Record Prints, two sets of Record CAD Drawing files, two copies of Record CAD Drawing plots. Plot and print each Drawing, whether or not changes and additional information were recorded.

i. E-mail: CAD and PDF formats

c. Record Specifications: Submit one electronic copy of Project's Specifications, including addenda and contract modifications.

PART 2 - PRODUCTS

2.01 RECORD DRAWINGS

A. Record Prints: Maintain one set of black-line prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Accurately record information in an understandable drawing technique.

b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.

b. Revisions to details shown on Drawings.

c. Depths of foundations below first floor.

d. Locations and depths of underground utilities.

e. Revisions to routing of piping and conduits.

f. Revisions to electrical circuitry.

g. Actual equipment locations.

h. Duct size and routing.

i. Locations of concealed internal utilities.

j. Changes made by Change Order or Construction Change Directive.

k. Changes made following Prime Consultant’s written orders.

l. Details not on the original Contract Drawings.

m. Field records for variable and concealed conditions.

n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record CAD Drawings: Prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:

1. Format: Same CAD program, version, and operating system as the original Contract Drawings. PDF format also.

2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.

3. Refer instances of uncertainty to Prime Consultant through Owners Project Manager for resolution.

4. The Contractor is free to negotiate a fee with the Prime Consultant, for the CAD Drawings of the Contract Drawings for use in recording Information.

C. Format: Identify and date each Record Drawing; include the designation “PROJECT RECORD DRAWING’ in a prominent location.

1. Record Prints: Organize Record Prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file. PDF format also.

3. Identification: As follows:

a. Project name.

b. Date.

c. Designation “PROJECT RECORD DRAWINGS.”

d. Name of Contractor.

2.02 RECORD SPECIFICATIONS

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

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

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.

5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.03 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

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 Specifications, arid Record Drawings where applicable.

2.04 MISCELLANEOUS RECORD SUBMITTALS

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

PART 3 - EXECUTION

3.01 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Prime Consultant’s and Owner’s reference during normal working hours.

END OF SECTION

DIVISION 2 – SITE CONSTRUCTION

SECTION 02070 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the following:

1. Demolition and removal of selected portions of a building or structure.

2. Repair procedures for selective demolition operations.

1.02 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Hospital ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.03 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reuse, salvaged, reinstalled, or otherwise indicated to remain on the Hospital's property, demolished materials shall become Contractor's property and shall be removed from Project site and properly disposed of.

1.04 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 County adopted editions and their amendments of NFPA 1, Fire Code.

1.05 PROJECT CONDITIONS

A. The Hospital will occupy portions of site immediately adjacent to selective demolition area. Conduct selective demolition so Hospital's operations will not be disrupted. Provide not less than 72 hours' notice to the WHFD AND/OR PROJECT MANAGER of activities that will affect Hospital'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 facilities or facilities in use without written permission from authorities having jurisdiction.

C. The Hospital assumes no responsibility for condition of areas to be selectively demolished.

1. The Hospital will maintain conditions existing at time of inspection for bidding purpose as far as practical.

D. Storage or sale of removed items or materials on-site is not permitted.

E. 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

2.01 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 equal or surpasses that of existing materials.

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

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected, capped, or relocated.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to the WHFD AND/OR PROJECT MANAGER.

D. Perform surveys as the work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES

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

B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by the WHFD AND/OR PROJECT MANAGER. Provide temporary services during interruptions to existing utilities, as acceptable to the WHFD AND/OR PROJECT MANAGER and to authorities having jurisdiction.

1. Provide at least 72 hours' notice to WHFD AND/OR PROJECT MANAGER if shutdown of service is required during changeover.

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

1. Arrange to shut off indicated utilities with utility companies.

2. 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.

3.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with other adjacent occupied and used facilities.

1. Do not close or obstruct other adjacent occupied or used facilities without permission from the WHFD AND/OR PROJECT MANAGER and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways as 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.

B. 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. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

4. Cover and protect furniture, furnishings, and equipment that have not been removed.

C. 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 weather-tight enclosure for building exterior.

3.04 POLLUTION CONTROLS

A. Dust Control: Use 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 flooding and pollution.

2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

B. 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.

C. 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.

3.05 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new work 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.

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.

5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

6. Dispose of demolished items and materials promptly.

7. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. 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 Contracting Officer.

4. Transport items to storage area designated by Contracting Officer.

5. Protect items from damage during transport and storage.

C. 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.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the WHFD AND/OR PROJECT MANAGER, 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.

E. Sealants: Remove no more existing sealants in joints that can be resealed by new sealant in one day by new sealant, including substrate preparation. Prepare no more new joints that can be sealed in one day.

3.06 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 walls that are to remain with an approved patching material applied according to manufacturer's written recommendations.

C. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction to the nearest break in the surface, change in material, or as approved by the WHFD AND/OR PROJECT MANAGER in order to eliminate evidence of patching and refinishing.

3.07 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 Hospital's property and legally dispose of them.

END OF SECTION

DIVISION 3 – CONCRETE

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Slabs-on-grade and curbs.

B. Related Section:

1. Section 01450 – Moisture Vapor & Alkalinity Testing.
2. Section 07920 – Joint Sealants.
3. Section 09651 – Resilient Flooring.

1.02 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and

laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, and testing agency.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Steel reinforcement and accessories.
4. Curing compounds.
5. Floor and slab treatments.
6. Semirigid joint filler.
7. Joint-filler strips.
8. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates.

E. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete."

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch minimum.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain-Steel Wire: ASTM A 82, as drawn.

2.03 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete

according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.04 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I or Type II.

B. Pozzolans: Fly Ash – ASTM C 618, Class C or F.

C. Silica Fume: ASTM C 1240, amorphous silica.

D. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

E. Water: ASTM C 94 and potable.

2.05 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.

2. Retarding Admixture: ASTM C 494, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.06 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.07 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 per ASTM D 2240.

C. Bonding agent in first paragraph below may be used directly from container or as an admixture in cement or sand-cement slurries and rubbing grout.

D. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

E. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.

F. Reglets: Fabricate reglets of not less than 0.022-inch thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

G. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.08 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.

4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.09 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Slabs-on-Grade and Curbs: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.

2. Maximum Water-Cementitious Materials Ratio: 0.50.

3. Slump Limit: 4 inches plus or minus 1 inch.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. Yd., increase mixing time by 15 seconds for each additional 1 cu. yd.

3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.

2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3. Install dovetail anchor slots in concrete structures as indicated.

3.03 REMOVING AND REUSING FORMS

A. General: Formwork for sides of footings, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by WHFD AND/OR PROJECT MANAGER.

3.04 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

B. Granular Course: Cover vapor retarder with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.05 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.06 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by WHFD AND/OR PROJECT MANAGER.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.

3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least 1 inch of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07920 - Joint Sealants, are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than

one length is required, lace or clip sections together.

3.07 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by WHFD AND/OR PROJECT MANAGER.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

   1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

   2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

   3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.08 FINISHING FLOORS AND SLABS

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

3.09 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.10 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive hot temperatures. Comply with ACI 301 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.

   b. Continuous water-fog spray.

   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.

   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on the project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to

manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by WHFD AND/OR PROJECT MANAGER. Remove and replace concrete that cannot be repaired and patched to WHFD AND/OR PROJECT MANAGER's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding

agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by WHFD AND/OR PROJECT MANAGER.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less

in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to WHFD AND/OR PROJECT MANAGER's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to WHFD AND/OR PROJECT MANAGER's approval.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: WHFD AND/OR PROJECT MANAGER will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from

beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 80 deg F and above, and one test for each composite sample.

6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C 31.

    a. Field-cured specimens in first subparagraph below may be required to verify adequacy of curing and protection of concrete, to verify strength for tilt-up concrete and post-tensioning concrete, or to verify strength for removal of shoring and reshoring in multistory construction. Revise number of test specimens if required.

b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.

   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

11. Test results shall be reported in writing to WHFD AND/OR PROJECT MANAGER, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by WHFD AND/OR PROJECT MANAGER but will not be used as sole basis for approval or rejection of concrete.

13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by WHFD AND/OR PROJECT MANAGER. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders

complying with ASTM C 42/C 42M or by other methods as directed by WHFD AND/OR PROJECT MANAGER.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

3.14 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

DIVISION 5 – METALS

SECTION 05120 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:

1. Section 09900 – Painting.

1.02 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.03 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.04 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate type, size, and length of bolts, distinguishing between shop and field

bolts.

1.05 QUALITY ASSURANCE

A. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided WHFD AND/OR PROJECT MANAGER's testing and inspecting agency observes repackaging and seals containers.

2. Clean and relubricate bolts and nuts that become dry or rusty before use.

3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

A. Channels, Angles Shapes: ASTM A 36.

Plate and Bar: ASTM A 36.

2.02 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.

1. Retain "Direct-Tension Indicators" Subparagraph below if applicable. If using corrosion-resisting (weathering) steel, revise Type 490 to Type 490-3; ASTM F 959M does not include a designation for corrosion-resistant steel.

2. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.

C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: As indicated on drawings.

2. Nuts: ASTM A 563 heavy-hex carbon steel.

3. Plate Washers: ASTM A 36/A 36M carbon steel.

4. Washers: ASTM F 436, Type 1, hardened carbon steel.

5. Finish: Hot-dip zinc coating, ASTM A 153, Class C.

D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy-hex carbon steel.

2. Plate Washers: ASTM A 36/A 36M carbon steel.

3. Washers: ASTM F 436, Type 1, hardened carbon steel.

4. Finish: Hot-dip zinc coating, ASTM A 153, Class C.

E. Threaded Rods: ASTM A 36.

1. Nuts: ASTM A 563 heavy-hex carbon steel.

2. Washers: ASTM F 436, Type 1, hardened carbon steel.

3. Finish: Hot-dip zinc coating, ASTM A 153, Class C.

F. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

G. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

H. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.03 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Galvanizing Repair Paint: SSPC-Paint 20.

2.04 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.05 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.

2. Fabricate beams with rolling camber up.

3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.

4. Mark and match-mark materials for field assembly.

5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."

F. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.

2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.06 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.

2. Surfaces to be field welded.

3. Surfaces of high-strength bolted, slip-critical connections.

4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

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

2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.07 SOURCE QUALITY CONTROL

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

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

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

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

   1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.03 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Splice members only where indicated.

C. Do not use thermal cutting during erection unless approved by WHFD AND/OR PROJECT MANAGER. Finish thermally cut sections within smoothness limits in AWS D1.1.

D. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.04 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

   1. Joint Type: As indicated on drawings.

3.05 FIELD QUALITY CONTROL

A. Special Inspections: WHFD AND/OR PROJECT MANAGER will engage a qualified special inspector to perform the following special inspections:

   1. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: WHFD AND/OR PROJECT MANAGER will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

3.06 REPAIRS AND PROTECTION

A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

   1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

B. Touchup Painting: Cleaning and touchup painting are specified in Section 09901 - Painting.

END OF SECTION

DIVISION 6 – WOOD & PLASTICS

SECTION 06160 - SHEATHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Plywood sheathing, backing and substrate.
2. Building paper.

B. Related Sections include the following:

1. Section 07242 – Direct-Applied Finish System.
2. Section 06500 – Architectural Woodwork.

1.03 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing

agency according to ASTM D 5516.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated plywood.

2. Fire-retardant-treated plywood.

1.04 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory," or GA-600, "Fire Resistance Design Manual."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

C. Factory mark panels to indicate compliance with applicable standard.

2.02 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA C9.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing].

2.03 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Comply with performance requirements in AWPA C27.

1. Use treatment that does not promote corrosion of metal fasteners.

2. Use Exterior type for exterior locations and where indicated.

3. Use Interior Type A, unless otherwise indicated.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Identify fire-retardant-treated plywood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

D. Application: Treat plywood indicated on Drawings.

2.04 WALL SHEATHING

A. Plywood Wall Sheathing: Exterior sheathing.

1. Span Rating: Not less than **16/0**.

2. Nominal Thickness: Not less than **1/2 inch (13 mm)**.

2.05 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. For wall sheathing, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

1. For wall sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For steel framing less than 0.0329 inch (0.835 mm) thick, attach sheathing to comply with ASTM C 1002.

2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, attach sheathing to comply with ASTM C 954.

2.06 WEATHER-RESISTANT SHEATHING PAPER

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

2.07 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with [APA AFG-01] [ASTM D 3498] that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

1. Use adhesives that have a VOC content of [70] <Insert limit> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Adhesive/vapor barrier: Urethane adhesive and moisture vapor control for adhering plywood sheathing to concrete.

1. Manufacturer: Bostick, Inc or approved equal.
2. Model: Bostick’s Best.
3. Apply adhesive per manufacturer’s instructions.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
3. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
4. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."

D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.02 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

5. Wall Sheathing:

a. Screw to cold-formed metal framing.

b. Unless otherwise noted, space panels 1/8 inch apart at edges and ends.

END OF SECTION

SECTION 06400 - ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Interior frames and jambs.
2. Plastic-laminate cabinets.
3. Quartz-material countertops.
4. Shop finishing of interior woodwork.

B. Related Sections include the following:

1. Section 06160 – Sheathing.
2. Section 07920 - Joint Sealants.

1.03 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.04 SUBMITTALS

A. Product Data: For high-pressure decorative laminate, adhesive for bonding plastic laminate, solid-surfacing material, fire-retardant-treated materials, cabinet hardware and accessories and finishing materials and processes.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details at a minimum scale of 1-1/2” = 1’-0”.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets and other items installed in architectural woodwork.
4. Apply WI-certified compliance label to first page of Shop Drawings.

C. Samples for Initial Selection:
1. Shop-applied opaque finishes.
2. Plastic laminates.
3. PVC edge material.
4. Quartz countertop material.

D. Samples for Verification:
1. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.
2. Edge banding: 6” strip for each type, color and pattern.
3. Quartz material, 6 inches (150 mm) square.
4. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Woodwork Quality Standard Compliance Certificates: WI-certified compliance certificates.

G. Qualification Data: For fabricator.

H. Manufacturer’s Warranty.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.

B. Installer Qualifications: Fabricator of products.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork.

D. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide WI-certified compliance certificates indicating that woodwork complies with requirements of grades specified.

E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support

woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.08 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Provide materials that comply with requirements of WI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.

2. Softwood Plywood: DOC PS 1.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include the following:

2. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by the following:

a. Wilsonart International; Div. of Premark International, Inc.

b. Type: Premium HPL 107

D. Quartz Countertop Material: Combination of natural quartz and small amounts of glass or metallic. Durable and non-porous material with texture that does not allow bacteria to grow and is resistant to stains.

1. Basis-of-Design Product: The design for counter top is based on product indicated. Subject to compliance with requirements by the following

a. SileStone by Cosentino.

b. No substitutions.

2. Type: Polished.

3. Colors and Patterns: Blanco Maple, Tropical Forest.

2.02 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified.

1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.

2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.

3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:

1. Type: Organic-resin-based formulation thermally set in wood by kiln drying.

2. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking plant certified

by testing and inspecting agency.

3. Kiln-dry materials before and after treatment to levels required for untreated materials.

2.03 CABINET HARDWARE AND ACCESSORIES

A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening and self-closing.

B. Back-Mounted Pulls: BHMA A156.9, B02011.

C. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip. Installed in holes drilled in cabinet sides and partitions.

F. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-overtravel-extension type; zinc-plated steel ball-bearing slides.

2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.

3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.

G. Door Locks: BHMA A156.11, E07121.

H. Drawer Locks: BHMA A156.11, E07041.

I. Grommets for Cable Passage through Countertops: 2-inch (51-mm), black, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Product: Subject to compliance with requirements, provide "SG series" by Doug Mockett & Company, Inc.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.04 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.

2. Contact Adhesive: 250 g/L.

E. Adhesive for Bonding Plastic Laminate: Un-pigmented contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.05 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch

(19 mm) Thick or Less: 1/16 inch (1.5 mm).

2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).

E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

F. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.06 PLASTIC-LAMINATE CABINETS

A. Grade: Custom.

B. WI Construction Style: Style A, Frameless.

C. WI Construction Type: II, single-length sections to fit access openings.

D. WI Door and Drawer Front Style: Flush overlay.

E. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS.

2. Postformed Surfaces: Grade HGP.

3. Vertical Surfaces: Grade HGS.

4. Edges: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.

F. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.

b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.

2. Drawer Sides and Backs: Solid-hardwood lumber.

3. Drawer Bottoms: Hardwood plywood.

G. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

H. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. See drawings for material and color.

2.07 QUARTZ MATERIAL COUNTERTOPS

A. Grade: Custom.

B. Quartz Material Thickness: 1/2 inch (13 mm).

C. Colors, Patterns, and Finishes: See drawings for selected color and pattern. Fabricate tops in one piece, unless otherwise indicated. Comply with quartz material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

D. Fabricate tops with shop-applied edges of materials and configuration indicated.

E. Fabricate tops with integral backsplashes and sidesplashes.

F. If required, install integral sink bowls in countertops in shop.

G. Drill holes in countertops for plumbing fittings in shop.

2.08 SHOP FINISHING

A. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish

coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.02 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches (900 mm) long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.

1. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).

H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.

2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertop support brackets as indicated on the drawings and comply with manufacturer's instructions.
2. Align adjacent quartz material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface
3. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
4. Secure integral backsplashes/sidesplashes to walls with adhesive.
5. Caulk space between backsplash/sidesplash and wall with sealant specified in Section 07920 - Joint Sealants.

J. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.03 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

SECTION 07210 – BUILDING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Work Includes: The extent of building insulation work is shown on the drawings, by the generic name.

B. The type of building insulation specified in this section include, but are not limited to, the following:

1. Acoustical batt insulation for partitions and ceilings.

1.02 RELATED SECTIONS

A. Section 09265 – Gypsum Board Assemblies

1.03 QUALITY ASSURANCE

A. Fire and Insurance Ratings: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface Burning Characteristics: ASTM E 84.

2. Fire Resistance Ratings: ASTM E 119.

3. Combustion Characteristics: ASTM E 136.

1.04 SUBMITTALS

A. Submit under the provisions of Section 01330 – Submittal Procedures.

B. Manufacturer's Data: Submit manufacturer's specifications and installation instructions for types of insulation required. Include data substantiating that materials comply with specified requirements.

C. Material Safety Data Sheets (MSDS): Submit MSDS for each material.

1.05 SAFETY PRECAUTIONS

A. Respirators and Other Concerns: Comply with OSHA 29 CFR 1910.134, “Respiratory Protection, ASTM C 930, Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories”, and other Federal, State and local regulations governing safety. Provide workers with dust/mist respirators, training in their use, and protective clothing as approved by the National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA).

B. Smoking: Do not smoke during installation of blanket insulation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in original sealed wrapping bearing manufacturer’s name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled or crushed. Comply with manufacturer’s recommendations for handling, storing, and protecting of materials before and during installation.

B. Storage: Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer’s original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. 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:

1. CertainTeed Corporation
2. Johns Manville
3. Owens-Corning
4. Or approved equal.

B. Substitutions: Only under provisions set forth in applicable specifications sections. Other manufacturers may be submitted for evaluation by the WHFD AND/OR PROJECT MANAGER by following the conditions of the substitutions clause. The WHFD AND/OR PROJECT MANAGER shall be the sole judge as to the acceptability of all products submitted for substitution.

2.02 MATERIALS

A. Acoustical Wall Insulation: ASTM C 665, Type I, unfaced, except a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with the procedures of ASTM E 84 fiberglass insulation batt for noise control in partitions where shown; friction fit, sized to fit framing spacing. Noise Reduction Coefficient (NRC) shall be not less than 0.90 for 2-1/2 inch metal stud wall, and not less than 1.05 for 3-5/8 inch metal stud wall unless partitions ratings indicated otherwise. NRC values as determined in accordance with ASTM C 423.

B. Recycled Materials: Provide insulation containing recycled materials to the extent practicable, provided the materials meet all other requirements of this section. The minimum required recycled materials content by weight are:

1. Rock Wool: 75 percent slag
2. Fiberglass:Minimum 25 percent glass cullet

2.03 ACCESSORIES

A. Mechanical Fasteners: Corrosion resistant fasteners as recommended by the insulation manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specified recommendations before proceeding with the work.
2. Extend wall insulation full thickness as shown over entire area to be

insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

3. Apply a single layer of insulation of the required thickness, unless otherwise shown of required to make up the total thickness.
4. Insulation shall be installed after construction has advanced to a point that the installed insulation will not be damaged by remaining work.
5. Space insulation from heat producing devices as recommended by the manufacturer, but not closer than 3 inches.
6. Electrical Wiring: Do not install insulation in a manner that would sandwich electrical wiring between two layers of insulation.

3.02 PROTECTION

A. Protect installed insulation and facing from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.

END OF SECTION

SECTION 07242 - DIRECT-APPLIED FINISH SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes materials and installation of exterior direct-applied cement board stucco backed with drainage mat and fluid applied air/moisture barrier, for frame walls.

1.02 RELATED SECTIONS

A. Section 06160 - Sheathing.

B. Section 07620 - Sheet Metal Flashing & Trim.

C. Section 07920 - Joint Sealants.

D. Section 09900 - Painting.

1.03 REFERENCED DOCUMENTS

A. ASTM International (ASTM)

1. C 150 Specification for Portland Cement
2. C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
3. C 1177 Specification for Glass Mat Gypsum for Use as Sheathing
4. C 1325 Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets
5. D 4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
6. E 84 Test Method for Surface Burning Characteristics of Building Materials
7. E 96 Standard Test Methods for Water Vapor Transmission of Materials
8. E 283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
9. E 330 Test Method for Structural Performance of Windows, Curtain Walls,

and Doors by Uniform Static Air Pressure Difference

10. E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
11. E 779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
12. E 2178 Standard Test Method for Air Permeance of Building Materials
13. E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

B. APA Engineered Wood Association.

1. PS 1 Voluntary Product Standard, Structural Plywood.
2. PS 2 Performance Standard for Wood-Based Structural-Use Panels.
3. E 30 APA Engineered Wood Construction Guide.

C. ICC (International Code Council).

1. 2006 and 2012 IBC (International Building Code).

D. ICC ES (International Code Council Evaluation Service).

1. AC 59 Acceptance Criteria for Direct Applied Exterior Finish Systems (DEFS).
2. ICC ESR 1233 StoGuard with Gold Coat, StoGuard with EmeraldCoat, and StoGuard VaporSeal Water-Resistive Barriers and StoEnergy Guard (StoGuard with Continuous Insulation).
3. ICC ESR 1510 PermaBase Brand Cement Board.
4. ICC ESR 2536 StoQuik Silver I, StoQuik Silver II, and StoQuik Silver NExT Cement Board Stucco Systems.

E. National Fire Protection Association (NFPA) Standards

1. NFPA 285 Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus.
2. NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall

Assemblies Using a Radiant Heat Energy Source

F. South Coast Air Quality Management District (SCAQMD)

1. Rule 1113 (2007) Architectural Coatings

G. USEPA (United States Environmental Protection Agency)

1. 40 CFR Part 59 (Code of Federal Regulations Title 40 Part 59 – National Volatile Organic Compound Emission Standards for Consumer and Commercial Products)

1.04 DESIGN REQUIREMENTS

A. Structural (wind and axial loads)

1. Design for maximum allowable deflection, normal to the plane of the wall of L/360

2. Design for wind load in conformance with code requirements using framing members designed to comply with the standards, strength, and stiffness requirements of the applicable code.

3. Maximum stud spacing: 16 inches (406 mm) on center

4. Sheathing: minimum ½ inch (13 mm) Exposure I plywood sheathing in compliance with US DOC PS-2

5. Drainage mat: maximum ¼ or 3/8 inch (6 or 10 mm) thick tangled filament nylon core with fabric facing.

6. Screw fasteners for cement board:

a. Steel framing – minimum #8 Type S-12 corrosion resistant screws with minimum 0.395 inch (10 mm) wafer head diameter and minimum 3/8 inch (9.5 mm) and three thread penetration into framing

i. Cement board fastener spacing: maximum 8 inches (203 mm) vertically along studs

ii. Ultimate wind load resistance capabilities:

a) Metal framing capable of achieving+166 psf, -94 psf (+7.94 kPa, -4.50 kPa): minimum 16 gage or heavier, minimum 6 inch (152 mm) depth and 2 inch (50.8 mm) flange width, cold formed C-

shaped steel stud framing spaced 16 inches (406 mm) on center maximum.

B. Moisture Control

1. Prevent the accumulation of water into or behind the cement board stucco, either by condensation or leakage into the wall construction, in the design and detailing of the wall assembly:

   a. Provide corrosion resistant flashing to protect exposed elements and to direct water to the exterior, including, above window and door heads, beneath window and door sills, at floor lines, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, and at the base of the wall.

   b. Vapor Diffusion and Condensation – perform a dew point analysis of the wall assembly to determine the potential for accumulation of moisture in the wall assembly as a result of water vapor diffusion and condensation. Adjust wall assembly components accordingly to minimize the risk of condensation. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.

   c. Provide StoGuard Air & Moisture Barrier and Sto DrainScreen over sheathing.

   d. At through wall expansion joints and at joints formed with back-to-back casing beads, back joints with StoGuard Transition Membrane. Refer to Sto Guide Details at www.stocorp.com.

   e. Seal cement board stucco accessory butt joints with appropriate sealant. Seal all cement board stucco terminations and penetrations through the cement board stucco wall assembly with appropriate sealant, or backer rod and sealant, as dictated by joint type.

C. Grade Condition

1. Do not specify cement board stucco for use below grade or on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure. Provide minimum 6 inch (150 mm) clearance above grade. Provide increased clearance in freeze/thaw climate zones.

D. Joints and Accessories

1. Provide back-to-back casing beads in the cement board stucco assembly where building movement is anticipated: at joints in the substrate or supporting construction, where the system is to be installed over dissimilar construction or substrates, at changes in building height, at floor lines, at columns and cantilevered areas. Back the joint with StoGuard Transition Membrane.
2. Provide one piece control joints at no greater than 25 ft (7.6 m) intervals and 625 ft^2 (58 m^2) for light colors (LRV $\geq$ 70), and at no greater than 16 ft (4.68 m) and every 256 ft^2 (23.5 m^2) for dark colors (LRV < 70 and $\geq$ 30). Do not exceed length to width ratio of 2-1/2:1 in expansion joint layout.
3. Provide one piece control joints at through wall penetrations, for example, at corners above and below windows, above doors, and similar penetrations through the wall. Alternatively use minimum 9 inch (229 mm) wide diagonal mesh reinforcement at corners over cement board sheathing that is cut in an "L" shape around the corner of the opening.
4. Provide minimum 3/8 inch (9 mm) wide joints where the system abuts windows, doors and other through wall penetrations.
5. Provide appropriate accessories at cement board stucco terminations and joints.
6. Avoid the use of channel reveal accessories which can interfere with proper drainage and proper stress relief.
7. Provide appropriate sealant at cement board stucco terminations and at stucco accessory butt joints.
8. Indicate location of joints, accessories and accessory type on architectural drawings.

E. Color Limitations

1. Select colors with a lightness reflectance value (LRV) of $\geq$ 30 and as dictated by allowable joint spacing (1.04 E2). Refer to Sto Color Chart for LRVs.

1.05 PERFORMANCE REQUIREMENTS

A. Air & Moisture Barrier

1. Compliant with ICC ES Acceptance Criteria AC 212 (refer to ICC ESR 1233)
2. Water Vapor Permeance, ASTM E 96, Method B: greater than 10 perms [573 ng/(Pa·s·m^2)]
3. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed less than 450, Class A Building Material
4. Tensile Adhesion, ASTM C 297:
5. Gypsum Sheathing, exceeds strength of substrate
6. Plywood, > 85 psi (590 kPa)
7. OSB, > 30 psi (206 kPa)
8. VOC, calculation:
    a. Less than 100 g/L
    b. Compliant with US EPA 40 CFR 59 for waterproofing/sealer
    c. Compliant with South Coast AQMD Rule 1113 for waterproofing/sealer

B. Drainage Mat

1. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed less than 450, Class A Building Material
2. Flame Propagation, NFPA 285: meets requirements for use on noncombustible (Types I, II, III, and IV) construction. Refer to ICC ESR 1233

C. Direct-Applied Cement Board Stucco Finish System and Components

1. Compliant with ICC ES AC 59.
2. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed less than 450, Class A building material
3. VOC: less than 50 g/L, compliant with South Coast AQMD Rule 1113 for architectural coatings

1.06 SUBMITTALS

A. Manufacturer's specifications, details, installation instructions and product data

B. Manufacturer’s code compliance report for air barrier and water-resistive barrier

C. Manufacturer’s code compliance report for cement board stucco

D. Manufacturer's standard warranty

E. Samples for approval as directed by the Hospital.

F. Fastener manufacturer’s pull-out or withdrawal capacity testing for frame construction

G. Prepare and submit project-specific details (when required by contract documents)

1.07 QUALITY ASSURANCE

A. Manufacturer Requirements

1. Cement board stucco and air barrier products manufacturer for a minimum of twenty five (25) years.

2. Cement board stucco finish products and air/moisture barrier products manufactured under ISO 9001:2008 Quality System and 14001:2004 Environmental Management System.

B. Contractor Requirements

1. Licensed, insured and engaged in application of stucco for a minimum of three (3) years.

2. Knowledgeable in the proper use and handling of Sto materials.

3. Employ skilled mechanics who are experienced and knowledgeable in stucco application, and familiar with the requirements of the specified work.

4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.

5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications.

C. Cement Board Manufacturer Requirements

1. Manufacturer of ASTM C 1325 compliant cement board

2. Cement board listed in a current ICC ES evaluation report

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.

B. Store cement board materials inside and protect from damage by the elements. Protect ends, edges, and faces of cement boards from damage.

C. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.

D. Protect portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

E. Handle and store all products as directed on labeling.

1.09 PROJECT/SITE CONDITIONS

A. Maintain ambient and surface temperatures above 40°F (4°C) during application and for 24 hours after application of air/moisture barrier and cement board stucco finish materials.

B. Provide supplementary heat for installation in temperatures less than 40°F (4°C) such that material temperatures are maintained as in 1.09A. Prevent concentration of heat on wet cement board stucco finish materials and vent fumes and other products of combustion to the outside to prevent contact with materials.

C. Prevent uneven or excessive evaporation of moisture from base coat during hot, dry or windy weather. Do not install base coat or finish coat if ambient temperatures are expected to rise above 100ºF (38ºC) within a 24 hour period.

D. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.10 COORDINATION/SCHEDULING

A. Protect sheathing from climatic conditions to prevent weather damage.

B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier and continuous moisture protection. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall and provide sill flashing. Coordinate installation of air/moisture barrier components with window and door installation to provide weather proofing of the structure and to prevent moisture infiltration and excess air infiltration.

C. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.

D. Install window head flashing prior to DEFS installation.

E. Splice-in head flashing, floor line flashing, diverter flashing, and similar flashing with air/moisture barrier detail component to provide a shingle lap that directs water to the exterior.

F. Protect air/moisture barrier with cement board stucco cladding assembly within 180 days of installation.

G. Protect drainage mat with cement board or other protection within 30 days of installation.

H. Commence the cement board stucco installation after completion of all construction that imposes dead loads on the walls to prevent excessive deflection (and potential cracking) of the cement board stucco.

I. Sequence interior work such as drywall installation prior to cement board stucco installation to prevent stud distortion (and potential cracking) of the cement board stucco.

J. Install sealant immediately after installation of the cement board stucco finishes and when finish coatings are dry.

K. Attach penetrations through cement board stucco to structural support and provide air tight and water tight seals at penetrations.

1.11 WARRANTY

A. Provide manufacturer's standard warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Air/Moisture Barrier, Drainage Mat, Cement Board Stucco Base Coat, Primers, Finishes

1. Sto Corp., 3800 Camp Creek Parkway, Building 1400, Suite 120. Atlanta, GA 30331.

2. Approved equal.

B. Cement Board

1. National Gypsum Company, Inc., 2001 Rexford Road, Charlotte, NC 28211.

2. Georgia-Pacific Gypsum, LLC., 133 Peachtree Street, NE, Atlanta, GA 30303.

3. Approved equal.

C. Cement Board Stucco Accessories

1. Plastic Components, Inc., 9051 NW 97th Terrace, Miami, Florida 33178.

2. Approved equal.

2.02 AIR/MOISTURE BARRIER

A. StoGuard-- fluid applied air/moisture barrier for sheathing, concrete, and concrete masonry substrates consisting of multiple compatible components, or approved equal:

1. Sto Gold Fill -- ready mixed acrylic based flexible joint treatment for rough opening protection, joint treatment of wall sheathing, CMU crack repair, and detail component for shiplap connections with flashing, starter track, and similar ship lap details.

2. Sto EmeraldCoat -- ready mixed flexible waterproof coating for wall sheathing, concrete and CMU wall surfaces

3. StoGuard Mesh-- nominal 4.2 oz/yd^2 (142 g/m^2), self-adhesive, flexible, symmetrical, interlaced glass fiber mesh, with alkaline resistant coating for compatibility with Sto materials, used with Sto Gold Fill to reinforce rough openings, inside and outside corners, sheathing joints, and shiplap

connections with flashing, starter track, and similar ship lap details

4. StoGuard Fabric – nonwoven cloth reinforcement used with Sto EmeraldCoat for rough opening protection, joint treatment of wall sheathing, and detail component for shiplap connections with flashing, starter track, and similar ship lap details
5. StoGuard RediCorner – a preformed fabric piece used in the corners of rough openings in tandem with StoGuard Fabric for quicker installation
6. StoGuard Transition Membrane – flexible air barrier membrane for continuity at transitions: sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, flashing shingle lap transitions, floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.
7. Sto RapidGuard - one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other static transitions in above grade wall construction such as: shingle lap over flashing, wall to balcony floor slab or ceiling, and through wall penetrations – pipes, electrical boxes, and scupper penetrations

2.03 ACCESSORIES FOR CEMENT BOARD STUCCO

A. Starter Track – Starter Track Drip Edge (Product No. STDE-xx) or i Drip Track (Product No. iDT-xx), rigid PVC (polyvinyl chloride) plastic tracks with weepholes as furnished by Plastic Components, Inc., for use at terminations such as base of wall, floor lines, roof lines, and similar weep termination lines, or approved equal.

B. Casing Bead – Starter Trac (Product No. ST-xx), a rigid PVC (polyvinyl chloride) plastic accessory as furnished by Plastic Components, Inc., for use at terminations such as windows, doors, and similar through wall penetrations, and used back-to-back at movement joints such as dissimilar materials, through wall expansion joints, and floor line deflection joints. May also be used back-to-back in lieu of a single piece control joint, or approved equal.

C. Outside Corners – Sto-Mesh Corner Bead Standard, one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement, or approved equal.

D. Drip Edge - Sto Drip Edge Profile, one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return, or approved equal.

E. Control Joint – "V" Control Joint (Product No. PL 093), rigid PVC (polyvinyl chloride) plastic single piece control joint as furnished by Plastic Components, Inc., for use at intervals in the field of the wall, and at corners of penetrations such as windows, doors, and similar through wall penetrations, or approved equal.

2.04 DRAINAGE MAT

A. Sto DrainScreen 6mm – nominal ¼" (6 mm) tangled filament nylon core drainage mat with fabric facing, or approved equal.

2.05 CEMENT BOARD

A. Cement Board – minimum ½ inch (13 mm) thick cement board in Compliance with ASTM C 1325

2.06 MECHANICAL FASTENERS FOR CEMENT BOARD

A. Corrosion resistant screw fasteners:

1. Steel Framing – minimum #8 Type S-12 corrosion resistant wafer head fasteners with minimum 3/8 inch (9.5 mm) and three thread penetration into framing and minimum 0.395 inch (10 mm) head diameter

2.07 JOB MIXED INGREDIENTS

A. Water: clean and potable.

B. Portland cement: Type 1 in compliance with ASTM C 150

2.08 CEMENT BOARD STUCCO JOINT REINFORCEMENT

A. StoGuard Mesh with Sto base coat, or approved equal.

2.09 CEMENT BOARD STUCCO BASE COAT

A. Base Coat (select one)

1. Sto BTS Xtra – one component high build lightweight polymer modified portland cement-based base coat material, or approved equal.

2.10 CEMENT BOARD STUCCO REINFORCING MESH

A. Sto Mesh--nominal 4.5 oz./yd2 (153 g/m2), symmetrical, interlaced open-weave glass fiber mesh treated with alkaline resistant coating for compatibility with Sto materials (achieves Standard Impact Classification over foam insulation board) , or approved equal.

2.11 PRIMER

A. StoPrime Sand—acrylic based tinted, sanded primer for base coat surfaces, or approved equal.

NOTE: Priming is recommended to provide uniform substrate absorption and finish color, to improve adhesion and water resistance, and to retard efflorescence.

2.12 FINISH COAT

A. Stolit Finish – integrally colored, factory blended, acrylic textured wall finish with graded marble aggregate, or approved equal.

2.13 MIXING

A. StoGuard, or approved equal.

1. Sto Gold Fill – mix with a clean, rust-free electric drill and paddle to a uniform consistency. Do not thin, or dilute with water.

2. Sto EmeraldCoat – mix with a clean, rust-free electric drill and paddle to a uniform consistency. Do not thin, or dilute with waterh.

B. Adhesive and Base Coats for Cement Board Stucco and Foam Build-outs:

1. Refer to applicable Sto Product Bulletin for selected adhesive/base coat material(s).

C. Primer--mix with a clean, rust-free high speed mixer to a uniform consistency.

D. Finish--mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water (up to 12 ounces [0.4 L]) may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.

E. Mix only as much material as can readily be used.

F. Do not add lime, anti-freeze compounds, or other additives to any of the materials.

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS

A. Pre-qualify under Quality Assurance requirements of this specification (section 1.h7.B).

3.02 EXAMINATION

A. Inspect sheathing surfaces for:

1. Damage and deterioration.

2. Moisture damage – record any areas of moisture damage.

B. Inspect sheathing application for compliance with applicable requirement:

1. Exterior Grade and Exposure 1 wood based sheathing – APA Engineered Wood Association E 30.

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the air/moisture barrier, or cement board stucco installation to the General Contractor. Do not proceed with air/moisture barrier, or cement board stucco installation until deviations are corrected.

3.03 SURFACE PREPARATION

A. Sheathing

1. Remove surface contaminants and replace damaged sheathing.

2. All sheathing must be handled and installed in compliance with applicable building code and/or manufacturer requirements. Installed sheathing must be clean, dry and free from damage, frost, and all bond-inhibiting materials. Abut gypsum sheathing joints. Gap wood sheathing 1/8 inch (3 mm) at joints. Should gaps exceed ⅛ inch (3 mm) up to 1/2 inch (13 mm) wide, use StoGuard RapidGuard to fill joints, or apply low expanding urethane foam into joints and rasp or shave flush with sheathing surface in preparation for installation of StoGuard joint treatment.

3. Spot surface defects in sheathing with joint treatment (Sto Gold Fill, StoGuard RapidGuard, StoGuard RapidGuard, or Sto EmeraldCoat).

3.04 AIR/MOISTURE BARRIER INSTALLATION

A. The following instructions are applicable to:

1. Exterior or Exposure I Plywood in compliance with PS-1

B. Transition Detailing

1. Detail transition areas with Sto RapidGuard or StoGuard Transition Membrane, or approved equal to achieve air barrier continuity. For illustrations of installation, refer to Sto Guide Details and Sto RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide (www.stocorp.com).

C. Rough Opening Protection (select 1, 2, 3, or 4 for frame construction; for concrete or concrete masonry rough openings with wood bucks and similar openings with complex 3-dimensional geometry, select no. 3 or 4, Sto RapidGuard or StoGuard RapidGuard):

1. Sto Gold Fill with StoGuard Mesh, or approved equal: apply 9 inch (229 mm) wide StoGuard Mesh at rough openings. Immediately apply Sto Gold Fill by spray or trowel over the mesh and spread smooth with a trowel to completely cover the mesh. For deep section studs use minimum 4 inch (102 mm) wide strips of StoGuard Mesh to seal sill and head to jamb corners. Crease and center the mesh at the sill/head to jamb intersection, press into place and apply Sto Gold Fill over the mesh (refer to Sto Detail 20.20M).

2. Sto EmeraldCoat with StoGuard Fabric, or approved equal: apply Sto EmeraldCoat liberally by spray or roller to corners of openings, immediately place StoGuard RediCorners in the wet coating, and apply additional coating over the RediCorners to completely embed them. For deep section studs cut minimum 4 inch (102 mm) strips of StoGuard Fabric to seal sill and head to jamb corners. Crease and center the fabric strips at the sill/head to jamb intersection and embed the fabric strips in Sto EmeraldCoat. After all corners have been completed apply Sto EmeraldCoat liberally to the entire rough opening, immediately place StoGuard Fabric in the wet coating, smooth any

wrinkles with a brush or roller, and apply additional coating over the fabric to completely embed it. Overlap all seams minimum 2 inches (51 mm). Once completed, top coat with additional coating as needed to completely seal the surface. Allow to dry and inspect for pinholes or voids. If pinholes or voids are present, seal with additional coating or Sto RapidGuard.

3. Sto RapidGuard, or approved equal: apply a fillet bead of material with a caulking gun at interior corners inside the opening to seal jamb/sill and jamb/head seams. Apply material in a zig-zag pattern along sill, jambs, and head to form a generous bead of material along the surface to be covered. Use a 6 inch (152 mm) wide plastic drywall knife to spread the material to a uniform thickness of 12-20 mils (0.3-0.5 mm) before the material skins. Treat the entire rough opening surface in this manner and overlap onto the face of the sheathing 2 inches (51 mm) minimum all the way around

4. StoGuard RapidGuard, or approved equal: apply a generous bead of StoGuard RapidGuard with a caulking gun in a zig-zag pattern along the inside and outside surface of the rough opening. Spread with a 6 inch (152 mm) wide plastic spreader all the way around the opening

D. Sheathing Joint Treatmenth

1. Sto Gold Fill with StoGuard Mesh, or approved equal: place 4 inch (102 mm) wide mesh centered along sheathing joints and minimum 9 inch (229 mm) wide mesh centered and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread smooth with a trowel to completely cover the mesh.

E. Air/Moisture Barrier Coating Installation

1. Plywood Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform wet mil thickness of 10 mils in one coat. Use ½ inch (13 mm) nap roller. Inspect surface and touch up areas (such as where OSB wood strands are raised) with a second coat of Sto EmeraldCoat, or approved equal to completely seal the surface. Protect from rain and freezing until completely dry.

F. Air /Moisture Barrier Connections and Shingle Laps

1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component, or approved equal to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

3.05 STARTER TRACK AND BACK MOUNT CASING BEAD ACCESSORY INSTALLATION

A. Strike a level line at the base of the wall to mark where the top of the starter track terminates.

B. Attach the starter track even with the line onto the structure a maximum of 16 inches (406 mm) on center with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8 inch (9 mm) penetration, and galvanized or zinc coated nails for wood framing with minimum 3/4 inch (19 mm) penetration. Blocking installed between the studs may be necessary to secure the track flat against the wall surface. For solid sheathing attach directly into sheathing at 12 inches (305 mm) on center maximum.

C. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow the cement board to be seated inside of track) and abut.

D. Install Starter Track at other cement board system terminations as designated on detail drawings: above windows and doors, at floor lines, above roof along dormers or gable end walls, and beneath window sills with concealed flashing.

E. Install casing beads similarly at cement board stucco termination points—window and door jambs and other through wall penetrations. Install back-to-back casing beads at building expansion joints, thru-wall joints, where the cement board

stucco abuts dissimilar construction or substrates, at changes in building height, at floor lines, columns, and cantilevered areas. Install full accessory pieces where possible and avoid small pieces. Where casing bead is used back-to-back as an expansion joint back the membrane with StoGuard Transition Membrane, or approved equal.

F. Splice-in starter track at base of wall, above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component, or approved equal to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

3.06 DRAINAGE MAT INSTALLATION

A. Place drainage mat against the wall surface and unroll horizontally with the fabric facing out. Staple into place with corrosion-resistant fasteners. Use as few fasteners as needed to hold the mat in place, starting from the bottom of the wall at the starter track and working up. Do not fasten through flashing. Shingle lap fabric at horizontal courses. Shingle lap drainage mat over starter track and flashing at floor lines, decks, roof lines, window heads, and other areas where flashing is required, to direct water to the exterior. Butt ends of rolls and vertical seams. Trim at accessories around windows, doors, vents, or other penetrations through the wall. Do not install behind window nail flanges or accessories. Lap over back leg of installed accessories. Immediately follow installation of drainage mat with cement board stucco installation. Where cement board stucco installation will not immediately follow installation of drainage mat, use corrosion-resistant cap nails, cap staples, or cap screws every 16 inches (406 mm) on center along framing for more secure attachment. Cover drainage mat with cement board within 30 days of installation.

3.07 CEMENT BOARD STUCCO INSTALLATION

A. After satisfactory inspection of surfaces and correction of any deviations from specification requirements commence the cement board stucco installation as described below. Ensure the installed cement board surface is straight and true within ¼ inch in 10 feet (2 mm/m), and is clean, dry and free from damage, frost, and all bond-inhibiting materials before application of coatings or accessories to cement board surface. Ensure the installed base coat or primed base coat

surface is clean, dry, free from damage, frost, and all bond inhibiting materials, including dust, dirt, salts, oil, grease, or laitance, before application of finish.

B. Cement Board Installation

1. Install cement board horizontally or vertically. Offset joints from sheathing joints by minimum six inches (152 mm). Insert bottom edge of board into the starter track, and then attach the board through the sheathing to studs/framing members with fasteners spaced 8 inches (203mm) on center maximum at the perimeter and in the field of the board, making sure that the fasteners seat flush with the surface of the cement board and do not penetrate the surface of the cement board.

2. Install cement boards with vertical joints staggered and with ends and edges closely butted but not forced together and flush at the surface. Cut boards in an “L” shape around openings such as windows, doors, and similar penetrations.

3. Provide for expansion joints and control joints in cement board layout (see Design Requirements, Section 1.04).

4. Install one piece control joints at wall penetrations, for example, above and below windows and doors. Refer to Sto Tech Hotline No. 0307-S. Install control joints in accordance with the following guidelines:

   a. Light colors (LRV $\geq$ 70) – at no greater than 25 ft (7.6 m) intervals and 625 ft2 (58 m^2)

   b. Dark colors (LRV < 70 and $\geq$ 30) – at no greater than 16 ft (4.68 m) intervals and every 256 ft^2 (23.5 m^2)

   c. Do not exceed length to width ratio of 2-1/2:1 in expansion joint layout.

5. Inside Corners: install corner bead accessory at inside corners adhesively or mechanically. Refer to Sto Tech Hotline No. 0307-S.

6. Outside Corners: install corner bead accessory adhesively by completely embedding the accessory in the base coat material. Refer to Sto Tech Hotline No. 0307-S

7. Drip Edge: install drip edge accessory by completely embedding the

accessory in the base coat material. Refer to Sto Tech Hotline No. 0307-S.

C. Cement Board Joint Reinforcement, Accessory Overlaps, and Corners of Wall Penetrations

1. Install StoGuard Mesh, or approved equal centered over cement board joints. After placing mesh over joints skim coat the surface with base coat to completely cover the mesh.

2. Install StoGuard Mesh, or approved equal over perforated accessory flanges up to the “stop bead” on the accessory – starter tracks, casing beads, corner beads, and control joints. After placing mesh over flanges skim coat the surface up to the “stop bead” on the accessory with base coat to completely cover the mesh.

3. At corners of wall penetrations where no control joint is used embed 9 x 12 inch (230 x 305 mm) detail mesh diagonally in base coat.

D. Reinforced Base Coat Installation

1. Apply base coat over the cement board, with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2-½ inches (64 mm) at mesh seams and fully overlap mesh at accessories to the accessory “stop bead.” Feather seams and edges. Double wrap all inside and outside corners with minimum 8 inch (203 mm) overlap in each direction where mesh is used in lieu of a corner bead accessory. Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible or if necessary to correct planar irregularities in the wall surface. Allow base coat to thoroughly dry before applying primer or finish.

2. Sloped Surfaces: for reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the weather exposed sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof

base coat and overlap mesh seams a minimum of 2-½ inches (65 mm). Allow base coat to thoroughly dry before applying primer or finish.

E. Primer Installation

1. Apply primer evenly by brush or roller to the dry base coat surface

F. Finish Installation

1. Apply finish by spraying or troweling with a stainless steel trowel, depending on the finish specified, to the dry base coat (or primed base coat) surface. Follow these general rules for application of finish:

   a. Avoid application in direct sunlight.

   b. Apply finish in a continuous application, and work a wet edge towards the unfinished wall area. Work to an architectural break in the wall before stopping to avoid cold joints.

   c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results; cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.

   d. Float “R” (rilled or swirl texture) finishes with a plastic float to achieve their rilled texture

   e. Do not install separate batches of finish side-by-side.

   f. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.

   g. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

3.08 PROTECTION

A. Provide protection of installed materials from water infiltration into or behind them.

B. Provide protection of installed materials from dust, dirt, precipitation, and freezing.

C. Provide protection of installed primer and finish from dust, dirt, precipitation, freezing and continuous high humidity until fully dry.

D. Provide sealant and backer material at cement board stucco terminations and at fixture penetrations through the cement board stucco to protect against air, water and insect infiltration. Provide weeps at floor lines, window and door heads, and other areas to conduct water to the exterior.

3.09 CLEANING, REPAIR AND MAINTENANCE

A. Clean and maintain the cement board stucco finish for a fresh appearance and to prevent water entry into and behind the assembly. Repair cracks, impact damage, spalls or delamination promptly.

B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the wall assembly.

C. Refer to Sto reStore Repair and Maintenance Guide (reStore Program) for detailed information on restoration – cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding.

END OF SECTION

SECTION 07620 - SHEET METAL FLASHING & TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Formed Products:

a. Metal Flashing

b. Liquid flashing.

B. Related Sections:

1. Section 07242 – Direct-Applied Finish System
2. Section 07920 – Joint Sealants.
3. Section 08900 – Louvers.
4. Section 09900 – Painting.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 – General Requirements apply to this Section.

1.03 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of special conditions.
7. Details of connections to adjoining work.
8. Detail formed flashing at a scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing (if requested): 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications (if requested): 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials (if requested): Full-size Sample.

E. Qualification Data: For qualified fabricator.

F. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

G. Warranty.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.07 WARRANTY

A. When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws.

B. The warranty provisions and number of years for the warrantee by this article shall take precedence over the standard provisions in the GENERAL CONDITIONS.

C. Project Warranty: Submit Contractor’s warranty, signed jointly by Installer covering work of this section for the following warranty period and conditions

1. Warranty Period: Two years from the Project Acceptance Date.

2. Warranty shall cover repairs or replacement of damages to the building and its finishes due to leaks.

PART 2 - PRODUCTS

2.01 SHEET METALS

A. General: Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.

2. Surface: Smooth, flat and with manufacturer's standard clear acrylic coating on both sides.

3. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

i. Color: Match existing.

2.02 LIQUID FLASHING

A. Available products but not limited to, APOC liquid flash permanent detail sealant, AP 515.

B. Color: To be determined.

C. Elongation: 500%.

2.03 UNDERLAYMENT MATERIALS

A. Inorganic SBS, ASTM D 226, minimum weight 37 lbs per 100 square feet.

2.04 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and

recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.

b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.05 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for

each application and metal.

2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.

D. Liquid Flashing: MB Technology Liquid flashing for flashing details, or approved equal.

E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

H. Do not use graphite pencils to mark metal surfaces.

2.06 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend beyond wall openings as indicated on the Drawings. Form head and sill flashing with end dams as indicated on the Drawings. Fabricate from the following materials.

1. Galvanized Steel: 0.022 inch (0.56 mm) thick.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.02 UNDERLAYMENT INSTALLATION

A. General: Install underlayment as indicated on Drawings or if required by the manufacturer.

B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 4 inches (100 mm).

C. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches (50 mm).

3.03 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 07920 - Joint Sealants.

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.04 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.05 LIQUID FLASHING INSTALLATION

A. Cleaning: Area of application must be dry, clean and free from grease and oils. Metals must be degreased with a suitable solvent.

B. Apply with brush or trowel to 125 mills. Comply with manufacturer’s instructions.

3.06 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.07 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07841 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

1.03 RELATED SECTIONS

A. Section 09265 – Gypsum Board Assemblies.

B. Division 15 – Mechanical.

C. Section 15300 – Wet Pipe Fire Sprinkler System.

D. Section15400 – Plumbing.

E. Division 16 – Electrical.

1.04 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

1. Fire-resistance-rated walls including fire walls, and fire partitions.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:

2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems

protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

a. Penetrations located outside wall cavities.

b. Penetrations located outside fire-resistance-rated shaft enclosures.

C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.05 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For Installer.

C. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.

D. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

E. Manufacturer’s Warranty.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installation Responsibility: Assign installation of through-penetration firestop systems in Project to a single qualified installer.

C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:

a. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

i. UL in its "Fire Resistance Directory."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-

penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.09 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by the WHFD AND/OR PROJECT MANAGER and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application on Drawings that are produced by one of the following manufacturers:

1. A/D Fire Protection Systems Inc.
2. Grace, W. R. & Co. - Conn.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.

7. RectorSeal Corporation (The).
8. Specified Technologies Inc.
9. 3M; Fire Protection Products Division.
10. Tremco; Sealant/Weatherproofing Division.
11. USG Corporation.

2.02 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:
    a. Slag-/rock-wool-fiber insulation.
    b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    c. Fire-rated form board.
    d. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.03 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

2.04 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.

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

3.02 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's

written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."

2. Contractor's name, address, and phone number.

3. Through-penetration firestop system designation of applicable testing and

inspecting agency.

4. Date of installation.

5. Through-penetration firestop system manufacturer's name.

6. Installer's name.

3.05 FIELD QUALITY CONTROL

A. Inspecting Agency: If required by the authorities having jurisdiction over the project, and/or required by the County adopted building code and its amendments, the Hospital will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.06 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

END OF SECTION

SECTION 07920 – JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Conditions and Special Conditions preceding these specifications shall apply to the work specified in this section.

B. Related Sections:

1. Section 03300 – Cast-In-Place Concrete.
2. Section 06400 – Architectural Woodwork.
3. Section 07242 – Direct-Applied Finish System.
4. Section 07620 – Sheet Metal Flashing & Trim.
5. Section 08710 – Door Hardware.
6. Section 08900 – Louvers.
7. Section 09265 – Gypsum Board Assemblies.
8. Section 09720 – Wall Covering.

1.02 GENERAL REQUIREMENTS

A. Work Included: Completely close with sealants all joints indicated or specified to be sealed to a watertight condition.

1.03 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Manufacturer's Data: Submit copies of manufacturer's product data and specifications for type of sealant required.

C. Color Samples: If applicable, submit color finish samples of sealants exposed to view.

1.04 JOB CONDITIONS

A. Examine joint surfaces and backing, and their anchorage to the structure, and conditions under which joint sealer work is to be performed, and notify the WHFD AND/OR PROJECT MANAGER in writing of conditions detrimental to proper

completion of the work and performance of sealers. Do not proceed with joint sealer work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

B. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.

1.05 PRODUCT HANDLING

A. Delivery: Deliver sealants to the job site in sealed containers labeled to show the designated name, formula, or specification number, lot number, color, date of manufacture, shelf life, curing time, manufacturer's directions, and name of manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sealant Backer Rod: Compressible rod stock of polyethylene foam, polyethylene-jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable, non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer to control the joint for sealant placement, to break bond of sealant at bottom of joint, to form optimum shape of sealant bead on back side, and to provide a highly compressible which will minimize the possibility of sealant extrusion when joint is compressed.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer.

C. Primer for Sealants: Non-staining, as recommended by the sealant manufacturer.

D. Sealant:

1. At Exterior Vertical and Overhead Joints: One-part polyurethane-based sealant, conforming to ASTM C 920, Type S, Grade NS, Use NT, Class 25 as applicable. Provide one of the following, or approved equal.

   a. Dymonic; Tremco

b. Chem-Calk 900; Bostic Construction Products Div.

c. Sikaflex la; Sika Corp.

2. At Interior Vertical and Overhead Joints: Non-Elastomeric Sealant; acrylic-emulsion type, conforming to ASTM C 834. Provide one of the following, or approved equal:

   a. Rubber Calk 280; PRC.

   b. Acrylic Latex Caulk; Tremco

   c. Chem-Calk 600; Bostik Construction Products Div.

3. At Horizontal Joints: Two-part polyurethane-based sealant, conforming to ASTM C 920, Type M, Grade P, Use T, Class 25. Provide one of the following, or an approved equal:

   a. THC-900; Tremco

   b. Sikaflex 2c SL; Sika Corp.

4. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints; complying with ASTM C 834. Provide one of the following or approved equal.

   a. BA-98; Pecora Corp.

   b. Tremco Acoustical Sealant; Tremco

   c. “Sheetrock” Acoustical Sealant; U.S. Gypsum Co.

5. Silicone Sealant: Mildew-resistant; Type S; Grade NS; Class 25; Use NT, formulated with fungicide; intended for sealing interior joints between plumbing fixtures and wall surfaces. Provide one of the following or approved equal:

   a. Dow Corning 786; Dow Corning Corp.

   b. SCS 1702 Sanitary; General Electric Co.

   c. Proglaze White; Tremco

   d. Omni Plus; Sonneborn

PART 3 - EXECUTION

3.01 INSTALLATION

A. Examine joints indicated to receive joint sealer, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealers until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; water; and surface dirt.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form release agents from concrete.

4. Clean metal, glass; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint surfaces.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or

damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturer's printed installation instructions applicable to products and application indicated, except where more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations or ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

D. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 19 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

E. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant move capability.

    a. Do not leave gaps between ends of joint fillers.

    b. Do not stretch, twist, puncture, or tear joint fillers.

    c. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

F. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant applications and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

2. Provide flush joint configuration per Figure 5B in ASTM C 1193, where indicated.

3.04 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers by joint sealers and of products in which joint occur.

3.05 PROTECTION

A. Protect joint sealers during and after curing period from contact with contaminating substances or form damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Project Acceptance. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new material to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION

DIVISION 8 – DOORS AND WINDOWS

SECTION 08100 – HOLLOW METAL DOOR FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal frames.
2. Fire rated door frames.

B. Related Sections:

1. Section 08210 - Wood Doors.
2. Section 08710 - Door Hardware.
3. Section 09110 – Non-Load Bearing Wall Framing.
4. Sections 09900 - Painting.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.

6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
10. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
11. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
12. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
13. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
14. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
15. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door frame design.
2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
3. Locations of reinforcement and preparations for hardware.
4. Details of anchorages, joints, field splices, and connections.
5. Details of conduit and preparations for power, signal, and control systems.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal door frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40” above sill) or UL 10C.

   1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.

   2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than above ambient after 30 minutes of standard fire-test exposure.

   3. Smoke Control Door Assemblies: Comply with NFPA 105.

D. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 1 – General Requirements with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal door frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door frames to be stacked in a vertical upright position.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.07 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace door frames that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective door frames.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide steel door frames from a SDI Certified manufacturer:

1. CECO Door Products (C).
2. Curries Company (CU).
3. Pioneer Industries (PI).

2.02 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.03 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.

2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.

3. Manufacturers Basis of Design:

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.04 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.

3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.05 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

    a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.

4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.

5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

6. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        i. Two anchors per jamb up to 60 inches high.

ii. Three anchors per jamb from 60 to 90 inches high.

iii. Four anchors per jamb from 90 to 120 inches high.

iv. Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

i. Three anchors per jamb up to 60 inches high.

ii. Four anchors per jamb from 60 to 90 inches high.

iii. Five anchors per jamb from 90 to 96 inches high.

iv. Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

v. Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

7. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Section 08710 - Door Hardware.

D. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section - Door Hardware.

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.

2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.

2.06 STEEL FINISHES

A. Prime Finishes: Door frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

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

3.02 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap door frames to receive non-template, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.

1. At fire-protection-rated openings, install frames according to NFPA 80.

2. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.

4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.

5. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.

6. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.

c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.

b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.

c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION

SECTION 08210 – WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior flush wood doors.
2. Acoustic (STC) rated wood doors.
3. Fire-rated flush wood doors.

B. Related Requirements:

1. Section 08100 – Hollow Metal Door Frames.
2. Section 08700 - Door Hardware.
3. Section 10810 – Toilet Accessories.

1.02 REFERENCES

A. Reference Standards: See other applicable sections. Comply with version year adopted by the Authority Having Jurisdiction. In addition to requirements shown or specified, comply with application provisions of following for design, materials, fabrication, and installation of component parts:

1. ANSI A117.1 – Accessible and Usable Buildings and Facilities.
2. ANSI A208.1 – Wood Particleboard.
3. WDMA I.S.1-A Window and Door Manufacturer's Association Architectural Wood Flush Doors.

1.03 COORDINATION

A. STC-Rated Doors: Where installed in hollow metal frames, fill frames with compressed mineral wool insulation.

1.04 PREINSTALLATION MEETINGS

A. Conduct pre-installation meeting at Project site.

B. Discussion Topics:

1. Delivery, storage, and handling.

2. Coordination with hardware and access control installers.

3. Protection of installed doors.

1.05 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Product Data: Each type of door and finish.

1. Core and edge construction.

2. WDMA I.S.1-A classification.

3. Fire rated doors.

4. Factory finish specifications.

C. Shop Drawings and Schedule:

1. Use same unit designations used in Contract Documents.

2. Hardware and wiring chase preparation.

3. Indicate location, size, and hand of each door.

4. Indicate dimensions and locations for mortises and holes for hardware.

5. Indicate dimensions and locations of cutouts.

6. Indicate location and extent of hardware blocking.

7. Indicate construction details not covered in Product Data.

8. Indicate door finish requirements.

9. Indicate fire protection ratings for fire rated doors.

D. Samples for Verification:

1. Selected HPL finish; minimum 8 by 10 inches (200 by 250 mm).

E. Warranty:

1. Provide sample of manufacturer’s warranty.

F. Closeout Submittal

1. Maintenance data.

2. Manufacturer warranties transferrable to Owner.

1.06 QUALITY ASSURANCE

A. Obtain flush wood doors through one single source from a single manufacturer wherever possible.

B. In addition to requirements specified, comply with WDMA I.S.1-A, latest edition "Industry Standard for Architectural Wood Flush Doors".

C. The top of each door shall bear a label from the manufacturer indicating the door construction, face veneer finish, cut and grade. If the doors are factory finished the label shall also have the finishing information.

D. The Door Manufacturer shall provide a letter, signed by an authorized company representative, to the WHFD AND/OR PROJECT MANAGER stating that the doors have been manufactured in compliance with this specification.

1.07 COORDINATION

A. Contractor shall be responsible for coordination and acquiring of all necessary information from hardware manufacturers. Door manufacturer shall be responsible for coordinating all necessary information received by Contractor from hardware manufacturers, in order that doors shall be properly prepared to receive hinges and hardware. Contractor shall provide his supplier with two copies of approved frame schedule, two copies of hardware schedule, and all necessary hardware templates. All the above information shall be in the possession of door supplier 120 days prior to desired delivery date of doors.

1.08 DELIVERY, STORAGE, AND HANDLING

A. No doors shall be delivered to the building until weatherproof storage space is available. Store and install doors in a dry space having controlled temperature between 60 deg F and 90 deg F (16 deg C and 32 deg C) and humidity range between 30 and 60 percent during the remainder of the construction period. Stack doors flat and off the floor, supported to prevent warpage. Protect doors from damage and direct exposure to sunlight.

B. Factory finish doors shall be individually wrapped in manufacturer’s standard plastic/polybags, stretch wrap, or cardboard cartons to protect the finish from damage and contact with other doors.

C. Do not walk or place other material on top of stacked doors. Do not drag doors across one another.

D. Contractor shall use all means necessary to protect doors from damage prior to, during, and after installation. All damaged doors shall be repaired or replaced by the contractor at no cost to the Owner.

E. Doors shall be palletized at factory in stacks of no more than 30 doors per pallet. Door edges shall be protected with heavy corner guards.

F. Mark each door on top rail with opening number used on Shop Drawings.

1.09 WARRANTY

A. Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inch (6 mm) in 42-by-84-inch (1065-by-2130-mm) section.

b. Telegraphing of core construction in face veneers exceeding 0.01 inch in 3-inch (0.25 mm in 76-mm) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

B. Warranty Periods:

1. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Products of Aspiro™ Series | Marshfield-Algoma by Masonite Architectural are specified to indicate requirements for quality and appearance.

1. Website: masonite.com/architectural/products/aspiro-series.

2. Phone: 877.332.4484

B. Or approved equal.

C. Source Control: Supply all wood doors from a single manufacturer.

2.02 MANUFACTURING STANDARDS

A. Interior Flush Wood Doors: Window & Door Manufacturers Association publication ANSI/WDMA I.S. 1A “Industry Standard for Interior Architectural Wood Flush Doors”.

B. Fire-Rated Wood Doors: Conforming to NFPA 80; listed and labeled for required ratings based on testing at positive pressure NFPA 252 or UL 10C by UL or other testing agency acceptable to authorities having jurisdiction

1. Temperature-Rise Limit: Where indicated and at vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 250 deg F (121 deg C) above ambient after 30 minutes of standard fire-test exposure.

2. Blocking: Provide composite blocking approved for use in doors of fire-protection ratings indicated as needed to maintain WDMA performance level and eliminate through-bolting hardware.

3. Vertical Edge Construction:

a. Category B Positive Pressure: Intumescent seals applied to door frame per requirements of Section 08710 - Door Hardware where required.

C. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control based on testing per UL 1784.

D. Acoustical Rating for Solid Core Doors: Where indicated in door schedule on Drawings, provide STC between 40 and 47 doors supplied with seals and gaskets tested by manufacturer.

2.03 LAMINATE FINISH WOOD DOORS INTERIOR SOLID CORE LAMINATE-FACED (HPDL) DOORS – CHOICE LAMINATE

A. Basis of Design: Aspiro™ Series | Marshfield-Algoma™ by Masonite Architectural.

B. Solid Core Choice Laminate (HPDL) Flush Doors:

1. WDMA Quality grade: Custom.

2. WDMA Performance Level: Heavy Duty, standard. Except Restrooms are Extra Heavy Duty

3. Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS. Vertical and post formable grade laminates are not acceptable.

   a. Colors, Patterns: Wilsonart, 7090 Fusion Maple.

4. Vertical Edges: Matching HPDL Edge Band applied after faces over Structural Composite Lumber. Matching **1/8 inch** (3.2mm) high impact edge bonded to structural composite lumber.

5. Horizontal Edges: Structural composite lumber. HPDL edge band (top rail only).

6. Core: Structural composite lumber.

7. Construction: Five Plies; stiles and rails bonded to core, and entire unit is abrasive planed. High pressure decorative laminate with high density fiberboard (HDF) crossbands.

8. Thickness: 1-3/4 inch.

C. Fire-Rated Choice Laminate (HPDL) Flush Doors.

1. Match appearance grade and applicable construction and performance requirements of other laminate finish flush wood doors.

2. Ratings: Category B positive pressure.

   a. 45-Minute Doors: Provide options.

3. Vertical Edges: High pressure decorative laminate over hardwood composite fire stile.

2.10 ACOUSTIC (STC) RATED INTERIOR FLUSH WOOD DOORS

A. Acoustic Rated Interior Flush Wood Doors.

1. Match appearance grade and applicable construction and performance requirements of laminate finish flush wood doors.

2. STC Ratings: Certified by manufacturer on basis of testing per ASTM E90 and E413. Rating requirements are stated in the door schedule on the Drawings.

3. Provide gasketing and door shoe as required to meet manufacturers tested acoustic rating.

2.11 DOOR CORE MATERIALS

A. Particleboard: Wood-based particleboard; ANSI A208.4, Grade LD-2 as required to meet WDMA Performance Duty level specified without added blocking..

B. Structural Composite Lumber: WDMA T.M.10.

2.12 FABRICATION

A. Factory Fitting: Fit to frame openings with clearances specified in WDMA I.S. 1A.

1. Undercut: Unless otherwise noted, maximum 3/8 inch (10 mm) above thresholds.

2. Fire-Rated Doors: Comply with NFPA 80.

B. Factory Machining: Machine doors for hardware that is not surface applied.

1. Verify dimensions for hardware mortises in metal frames before machining.

C. Contractor Option: Doors supplied with wood frames may have hardware installed at factory.

2.13 FINISHES

A. Finish Grade: Match grade of door.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect each door before installation for damage and defects per WDMA Section F-6.

3.02 INSTALLATION

A. Hardware installation is conforming to Section 08700 – Door Hardware.

B. Reference Standards:

1. Wood Doors: WDMA I.S. 1A.

2. Fire-Rated Doors: NFPA 80.

3. Smoke-and Draft-Control Doors: NFPA 105.

C. Align doors with uniform vertical and top edge clearance.

3.03 REPAIR

A. Repair of damage or defects is subject to Architect's acceptance, including removal of soiling. Provide new replacement doors for doors that cannot be satisfactorily repaired.

3.04 PROTECTING AND CLEANING

A. Protect installed doors from damage and soiling.

B. Clean doors shortly before inspection for Substantial Completion.

END OF SECTION

SECTION 08710 – DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Section 01310 Project Management & Coordination.
2. Section 01770 - Closeout Procedures.
3. Section 07920 – Joint Sealants.
4. Section 08100 - Hollow Metal Door Frames.
5. Section 08210 - Wood Doors.
6. Division 16 – Electrical.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.

4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.03 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
    a. Type, style, function, size, label, hand, and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.

d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

e. Explanation of abbreviations, symbols, and codes contained in schedule.

f. Mounting locations for door hardware.

g. Door and frame sizes and materials.

h. Warranty information for each product.

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

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.

b. Complete (risers, point-to-point) access control system block wiring diagrams.

c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider of the primary Integrated Wiegand Access Control Products.

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

F. Informational Submittals:

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

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

1.04 QUALITY ASSURANCE

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

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

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

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

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

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

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

F. Keying Conference: Conduct conference to comply with requirements in Section 01310 Project Management & Coordination keying conference to incorporate the following criteria into the final keying schedule document:

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

2. Plans for existing and future key system expansion.

3. Requirements for key control storage and software.

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

5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Section 01310 Project Management & Coordination with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

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

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

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

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

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

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.06 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

D. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.07 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Twenty five years for manual surface door closer bodies.
3. Two years for electromechanical door hardware.

1.08 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Section 00500 – Substitution Request Form and Division 1 – General Requirements. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.

b. Three Hinges: For doors with heights 61 to 90 inches.

c. Four Hinges: For doors with heights 91 to 120 inches.

d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.

   b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.

   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

   a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - TA Series.

2.03 POWER TRANSFER DEVICES

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

   1. Manufacturers:

      a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - QC (# wires) Option.

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

1. Provide one each of the following tools as part of the base bid contract:

    a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Electrical Connecting Kit: QC-R001.

    b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:

    a. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – QC-C Series.

2.04 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years of experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.

2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

3. Bored-Lock Type: Cylinders with tailpieces to suit locks.

4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder

face to be flush and be free spinning with matching finishes.

5. Keyway: Match Facility Standard.

D. Permanent Cores: Match standard. Reference Division 01 for material required under project. Installation to be included under Division 08 "Door Hardware" base bid package.

1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.

E. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.

2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.

3. Existing System: Field verify and key locks to match Owner's existing system.

F. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)

2. Master Keys (per Master Key Level/Group): Five (5).

3. Construction Keys (where required): Ten (10).

G. Construction Keying: Provide construction master keyed cylinders.

H. Construction Keying: Provide temporary keyed construction cores.

I. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

2. Provide transcript list in writing or electronic file as directed by the Owner.

2.05 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Mortise locks to be certified Security Grade 1.

2. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.13 requirements to 10 million cycles.

3. Provide status indicators with highly reflective color and wording for “locked/unlocked” or “vacant/occupied” with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1” x 0.6” with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.

4. Manufacturers:

   a. Sargent Manufacturing (SA) – 8200 Series.

   b. No Substitution.

2.06 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

2. Strikes for Bored Locks and Latches: BHMA A156.2.

3. Strikes for Auxiliary Deadlocks: BHMA A156.36.

4. Dustproof Strikes: BHMA A156.16.

2.07 DOOR CLOSERS

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

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

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

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

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

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

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

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

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

1. Manufacturers:

a. Sargent Manufacturing (SA) - 281 Series.

b. No Substitution.

2.08 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

   a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:

   a. Hiawatha, Inc. (HI).

   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

   c. Trimco (TC).

2.09 DOOR STOPS AND HOLDERS

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

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where

floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Hiawatha, Inc. (HI).

    b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

    c. Trimco (TC).

2.10 ARCHITECTURAL SEALS

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

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

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

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

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

F. Manufacturers:

1. National Guard Products (NG).

2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

3. Reese Enterprises, Inc. (RE).

2.11 ELECTRONIC ACCESSORIES

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

1. Manufacturers:

a. Securitron (SU) - AQ Series.

2.12 FABRICATION

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

2.13 FINISHES

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

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

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

PART 3 - EXECUTION

3.01 EXAMINATION

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

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

3.02 PREPARATION

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

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

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

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Section 07920 - Joint Sealants.

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

3.04 FIELD QUALITY CONTROL

A. Field Inspection (Punch-Out Report): Reference Section 01770 - Closeout Procedures. Final inspect installed door hardware and state in report whether work complies with or deviates from specification requirements, including whether door hardware is properly installed, operating and adjusted.

3.05 ADJUSTING

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

3.06 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

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

3.07 DEMONSTRATION

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

3.08 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Manufacturer’s Abbreviations:

1. MK – McKinney.
2. SA – Sargent.
3. OT – Other.
4. RO – Rockwood.
5. PE – Pemko.
6. SU – Securitron.

Hardware Sets

Set: 1.0

Doors: 6

2 Hinge, Full Mortise	TA2714	US26D	MK
1 Electric Hinge	TA2714-QC	US26D	MK ⚡
1 Access Control Mort Lock	21 H2-82271 LNL	US26D	SA
1 Final Core	By Owner	626	OT
1 Surface Closer	281 O/P9 to suit location	EN	SA
1 Kick Plate	K1050 10" high BEV CSK	US32D	RO
1 Wall Stop	406/409 as required	US26D	RO
1 Gasketing	S88BL Width x Height		PE
1 Frame Harness	QC-C1500		MK ⚡
1 Door Harness	QC-C__ (as required)		MK ⚡
1 Power Supply	AQD series		SU ⚡

Notes: Door normally closed and secure. Valid credentials presented to card readers allows temporary access. Upon loss of power, door remains secure. Key override provided. Free egress at all times.

Set: 2.0

Doors: 3, 4, 5

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Office/Entry Lock	21 8205 LNL	US26D	SA
1 Final Core	By Owner	626	OT
1 Wall Stop	406/409 as required	US26D	RO
1 Gasketing	S88BL Width x Height		PE

Set: 3.0

Doors: 1

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Office/Entry Lock	21 8205 LNL	US26D	SA
1 Final Core	By Owner	626	OT
1 Surface Closer	281 O/P9 to suit location	EN	SA
1 Kick Plate	K1050 10" high BEV CSK	US32D	RO
1 Wall Stop	406/409 as required	US26D	RO
1 Gasketing	S88BL Width x Height		PE

Set: 4.0

Doors: 2, 7

3 Hinge, Full Mortise	TA2714	US26D	MK
1 Privacy Lock	V21 8265 VN1L	US26D	SA
1 Surface Closer	281 O/P9 to suit location	EN	SA
1 Kick Plate	K1050 10" high BEV CSK	US32D	RO
1 Mop Plate	K1050 6" high BEV CSK	US32D	RO
1 Wall Stop	406/409 as required	US26D	RO
1 Gasketing	S88BL Width x Height		PE

END OF SECTION

SECTION 08830 - MIRRORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provision of the Contract, including DAGS General Conditions and Division 1 General Requirements apply to this Section.

1.02 SUMMARY

A. Section includes the following types of silvered flat glass mirrors:

1. Annealed monolithic glass mirrors.

1.03 RELATED SECTIONS

A. Section 09110 – Non-Load Bearing Wall Framing.

B. Section 09625 – Gypsum Board Wall Assemblies.

C. Section 09720 – Wall Covering

D. Section 10810 – Toilet Accessories.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Product Data: For each type of product indicated.

1. Mirrors: Include description of materials and process used to produce each type of silvered flat glass mirror, specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

C. Shop Drawings: Include mirror elevations, edge and frame details, mirror hardware, and attachments to other work.

D. Qualification Data: For qualified Installer.

E. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.

F. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed.

G. Maintenance Data:

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has complete mirror glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in mirror installation with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Project as Level 2 (Senior Glazers) or Level 3 (Master Glazers).

B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer for each type of mirror indicated.

C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source for each type of accessories indicated.

D. Glazing Publications: Comply with the following published recommendations:

1. GANA's "Glazing Manual" unless for stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section on in referenced standards.

2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care of Handling of Mirrors."

E. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

F. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing paint and film and substrates on which mirrors are installed.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, an abrasion of glass surfaces and applied coatings. Store indoors.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrors until space is enclosed and weatherproof, wet-work in space is completed and nominally dry work, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

B. Field Measurements: Check actual mirror placement by accurate field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with fabricating without field measurements. Coordinate construction to ensure that actual mirror placements dimensions correspond to guaranteed dimensions.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of Project Acceptance.

a. Surety shall not be held liable beyond two years from Project Acceptance date.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

Provide products by the manufacturer specified.

2.02 MIRROR AND GLASS PRODUCTS

A. GL-1

1. Product: Clear Mirror

2. Thickness: 4mm

3. Glass finish: Polished

2.03 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with mirror backing paint as certified by mirror manufacturer.

D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.04 MIRROR HARDWARE

A. Frame: Stainless steel.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.05 FABRICATION

A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes.

B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and field verify the cutout sizes so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Flat Polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.

2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

D. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.02 PREPARATION

Comply with manufacturer's written installation instructions for preparation of substrates.

3.03 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Provide a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

1. Mirror Clips: Place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges. Locate clips so they are symmetrically

placed and evenly spaced.

2. Install mastic as follows:

   a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.

   b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.

   c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface.

3.04 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION

SECTION 08900 - LOUVERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Extruded aluminum, wind driven rain resistant and wind-borne debris resistant stationary louver with horizontally mounted sight proof blades.

B. Related Sections:

1. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.
2. Section 07620 – Sheet metal Flashing & Trim.
3. Section 07920 – Joint Sealants.
4. Section 09900 – Painting.
5. Division 15 – Mechanical.
6. Section 15810 – Ductwork & Ductwork Accessories.

1.02 REFERENCES

A. AAMA 611 – Voluntary Specification for Anodized Architectural Aluminum.

B. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.

C. AMCA 511 - Certified Ratings Program for Air Control Devices.

D. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

G. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

H. ASTM D2244 - Standard Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.

1.03 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.

C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

D. Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.04 PERFORMANCE REQUIREMENTS

A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

B. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. Design earthquake spectral response acceleration, short period (Sds) for Project is 1.0.

2. Component Importance Factor is 1.0.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.05 SUBMITTALS

A. Submit under the provisions of Section 01330 – Submittal Procedures.

B. Product Data: For each type of product indicated.

1. Manufacturer's product data including performance data.

2. Preparation instructions and recommendations.

3. Storage and handling requirements and recommendations.

4. Installation methods.

5. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

C. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.

2. Show mullion profiles and locations.

3. Show materials, construction, dimensions, accessories, and installation details.

D. Product Schedule: Use same designations indicated on Drawings.

E. Samples: Submit sample of louver material, finish, and color.

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

G. Qualification Data: For manufacturer and Installer.

H. Product Test Reports: For each type of louver for tests performed by a qualified testing agency indicating compliance with specified performance requirements.

I. Field quality control reports.

J. Manufacturer’s written warranty.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Manufacturer Qualifications:

1. The manufacturer shall have implemented the management of quality objectives, continual improvement, and monitoring of customer satisfaction to assure that customer needs and expectations are met.

2. Manufacturer shall be International Organization for Standardization (ISO) 9001 accredited.

C. Product Qualifications:

1. Louvers licensed to bear AMCA Certified Ratings Seal. Ratings based on tests and procedures performed in accordance with AMCA 511 and comply with AMCA Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance and water penetration ratings.

2. Louvers shall be factory engineered to withstand the specified seismic loads.

a. Minimum design loads shall be calculated to comply with ASCE – 7, or local requirements of Authority Having Jurisdiction (AHJ).

D. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

2. AWS D1.3, "Structural Welding Code - Sheet Steel."

3. AWS D1.6, "Structural Welding Code - Stainless Steel."

E. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.

C. Handling: Protect materials and finishes during handling and installation to prevent damage.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.09 WARRANTY

A. Manufacturer shall provide standard limited warranty for louver systems for a period of five years (60 months) from date of installation, no more than 60 months after shipment from manufacturing plant. When notified in writing from the Owner of a manufacturing defect, manufacturer shall promptly correct deficiencies without cost to the Owner.

B. Manufacturer shall provide 20 year limited warranty for fluoropolymer-based finish on extruded aluminum substrates.

1. Finish coating shall not peel, blister, chip, crack or check.
2. Chalking, fading or erosion of finish when measured by the following tests:
3. Finish coating shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D4214.
4. Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D2244 and ASTM D822.
5. Finish coating shall not erode at a rate in excess of 10%/ 5 year as determined by Florida test sample.

C. Manufacturer shall provide a 5 year limited warranty for Class I and a 3 year limited warranty for Class II anodized finish on extruded aluminum substrates.

1. Seller warrants the Finish under normal atmospheric conditions.

a. Will not crack, craze, flake or blister

b. Will not change or fade more than (5) Delta-E Hunter units as determined by ASTM method D-2244

c. Will not chalk in excess of ASTM D-4214-07 number (8) rating, determined by the procedure outlined in ASTMD-4214-07 specification test.

2. Any forming or welding must be done prior to finishing. Post forming or welding will void the warranty.

3. This Warranty applies only if the anodized aluminum product is installed in strict accordance with Seller's recommended practices and maintained in accordance with AAMA (American Architectural Manufacturers Association) publication number 609 and 610-09 ("Cleaning and Maintenance Guide for Architecturally Finished Aluminum").

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Aluminum Castings: ASTM B 26/B 26M, Alloy 319.

D. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.

2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

3. For color-finished louvers, use fasteners with heads that match color of louvers.

E. Post-installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to

sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.02 FABRICATION, GENERAL

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing, to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

D. Include supports, anchorages, and accessories required for complete assembly.

1. Exterior Corners: Prefabricated corner units with mitered and welded blades at corners.

E. Provide subsills made of same material as louvers for recessed louvers.

F. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.03 MANUFACTURER

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Ruskin Company; 3900 Dr. Greaves Road, Kansas City, Missouri 64030. Tel: (816) 761-7476.

2. Requests for substitutions will be considered in accordance with provisions of Section 01600 – Product Requirements.

2.04 STATIONARY BLADE LOUVER:

A. Model: EME420DD.

B. Fabrication: Extruded Aluminum stationary horizontal chevron louver style.

1. Design: Double drainable blades shall be contained within the frame with double downspouts in jambs and mullions. Louver design shall limit span between visible mullions to 120 inches (3048 mm).

2. Frame:

   a. Frame Depth: 4 inches (100 mm).

   b. Material: Extruded aluminum, Alloy 6063-T6.

   c. Wall Thickness: 0.081 inch (2.1 mm), nominal.

3. Blades:

   a. Style: Horizontal.

   b. Material: Extruded aluminum, Alloy 6063-T6.

   c. Exterior Wall Thickness: 0.063 inch (1.6 mm), nominal.

4. Fabrication:

   a. Mullion Style – Visible mullions or frames are utilized at the perimeter of the louver with continuous blade appearance up to 120 inches (3048 mm) wide. Louvers wider than 120 inches (3048 mm) shall incorporate visible mullions at certain intervals vertically within the louver perimeter to support the louver blades. Intermediate rear-mounted blade supports may be utilized between mullions but shall not interrupt blade appearance from exterior.

5. Assembly:

   a. Factory assembled louver components. Mechanically fastened construction.

6. Minimum assembly size: 12 inches wide by 6 inches high (305 mm x 102 mm).

7. Recycled Content: 18% post-consumer. 55% pre-consumer, post-industrial, total 73% by weight.

C. Performance Data:

1. Performance Ratings: AMCA licensed.

a. Based on testing 48 inch by 48 inch (1219 mm by 1219 mm) size unit in accordance with AMCA 500.

2. Free Area: 40 percent, nominal.

3. Free Area Size: 6.33 sf (.59 sm).

4. Maximum Recommended Air Flow through Free Area: 1250 feet per minute (6.4 m/s).

5. Air Flow: 7913 cubic feet per minute (136 cu. m/min).

D. Wind Driven Water Penetration Performance:

1. Based on testing 39 inches x 39 inches (1 m x 1 m) core area, 41 inches x 44 inches (1.04 m x 1.12 m) nominal size unit in accordance with AMCA 500-L.

2. Wind Velocity: 29 mph (47 kph).

a. Rainfall Rate: 3 inches/hour (76 mm/hour).

b. Free Area Velocity: 1190 feet per minute (362.7 m/sec).

c. Water Resistance Effectiveness: 99.% (AMCA Class A).

3. Wind Velocity: 50 mph (80 kph).

a. Rainfall Rate: 8 inches/hour (203 mm/hour).

b. Free Area Velocity: 759 feet per minute (231.3 m/sec).

c. Water Resistance Effectiveness: 99.3% (AMCA Class A).

E. Design Wind load: Per Code.

F. Louvers shall be factory engineered to withstand the specified seismic loads.

1. Minimum design loads shall be calculated to comply with ASCE – 7, or local requirements of Authority Having Jurisdiction (AHJ).

2.05 ACCESSORIES

A. Insulated Aluminum Blank-Off Panels: 0.040 (1 mm) aluminum sheet, 2 inch (51 mm) aluminum skin insulated core, factory installed with removable fasteners and neoprene gaskets.

B. Aluminum Filter Racks: Formed channel racks to accept standard thick filters. Unused bottom portion blanked off with 0.040 inch (1 mm) aluminum sheet.

1. Coordinate with Division 15 - Mechanical

C. Extended Sills:

1. Extruded aluminum, Alloy 6063-T6. Minimum nominal thickness 0.060 inch (1.5 mm).

2. Formed Aluminum, Alloy 3003. Minimum nominal thickness 0.081 inch (2.1 mm).

D. Visible Mullions: Manufacturer's standard vertical visible mullions for architectural accent as indicated on drawings.

2.06 LOUVER SCREENS

A. Insect Screens:

1. Aluminum: 18-16 mesh, mill finish, .011 inch (0.3 mm) wire.

2. Frame: Aluminum.

3. Location: Interior. Confirm with manufacturer recommendations.

B. General: Provide screen at each exterior louver.

C. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.

D. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.

2. Finish: Same finish as louver frames to which louver screens are attached.

3. Type: Rewirable frames with a driven spline or insert.

2.07 ALUMINUM FINISHES

A. Anodized Finish:

1. Class I Color Anodized.

a. Comply with Aluminum Association AA-C21A44.

b. Apply finish following chemical etching and pretreatment.

c. Minimum Thickness: 0.7 mils (0.018 mm), 60 minute anodizing process.

d. Class I Color Anodized: Match existing Hospital louver color.

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

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.02 PREPARATION

A. Clean opening thoroughly prior to installation.

B. Prepare surfaces using methods recommended by the manufacture for achieving the best result for the substrate under the project conditions.

C. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.03 INSTALLATION

A. Install louvers at locations indicated on the drawings and in accordance with manufacturer’s instructions.

B. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

C. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

D. Form closely fitted joints with exposed connections accurately located and secured.

E. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

F. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

G. Protect unpainted galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

H. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07920 - Joint Sealants for sealants applied during louver installation.

3.04 ADJUSTING AND CLEANING

A. Test operation of louvers and adjust as needed to produce fully functioning units that comply with requirements.

B. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

C. Before final inspection, clean louver surfaces in accordance with manufacturer's instructions. Thoroughly clean and dry surfaces.

D. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

DIVISION 9 – FINISHES

SECTION 09110 – NON-LOAD BEARING WALL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Non-load bearing metal studs for wall assemblies and related items necessary to complete the Project as indicated on the Drawings and specified herein.

B. Related Sections:

1. Section 07240 – Direct-Applied Finish System.
2. Section 08100 – Hollow Metal Door Frames.
3. Section 08830 – Mirrors.
4. Section 09260 – Gypsum Board Assemblies.
5. Section 09511 – Acoustical Panel Ceiling.
6. Section 10260 – Corner Guards.
7. Section 10400 – Signage.
8. Section 10810 – Toilet Accessories.

1.02 REFERENCES

A. The latest editions of the following references, codes and standards are hereby made a part of this Section and installation work shall conform to applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements. In case of conflicts among references, codes, standards and this Section, the most stringent shall apply.

B. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated areas of Hot-Dip Galvanized Coatings; 2000.

C. ASTM A 1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2001.

D. ASTM B 633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 1998.

E. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members, 2000.

F. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products, 2000.

G. ASTM C 1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.

H. AISI Specification for the Design of Cold-Formed Structural Members; 1996.

I. AISI – Standard for Cold-Formed Steel Framing General Provisions

1.03 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Product Data: Submit manufacturer's data sheets on each product specified, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

B. Pre-installation Meetings: If requested by the WHFD AND/OR PROJECT MANAGER, conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer’s installation instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation per requirements of ASTM C645.

1.06 ENVIRONMENTAL CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Dietrich Metal Framing; 500 Grant Street, Suite 2226, Pittsburgh, PA 15219. ASD. Tel: (412) 281-2805. Fax: (412) 281-2965. E-mail: askforhelp@dietrichindustries.com. www.dietrichmetalframing.com.

1. Dietrich Metal Framing; 91-300 Hanua Street, Kapolei, HI (808) 682-5747.

B. Substitutions: Other manufacturers of equal quality may be substituted if approved by the WHFD AND/OR PROJECT MANAGER. The burden of proof of equality shall be borne by the Contractor.

C. All metal framing components and accessories shall be the product of a single manufacturer.

2.02 COMPONENTS

A. Studs: Cold-formed galvanized steel C-studs, in conformance with AISI Specifications for Design of Cold-formed Steel Structural Members; Dietrich Big “D” drywall studs.

1. Designation and size as indicated on the drawings.

   a. Minimum Delivered Thickness: Designation: STE-20 gauge, 0.0297 inches (0.75 mm) steel thickness, drywall stud.

   b. Minimum Delivered Thickness: Designation: STH-22 gauge, 0.0269 inches (0.68 mm) steel thickness, drywall stud.

   c. Minimum Delivered Thickness: Designation: STN-25 gauge, 0.0179 inches (0.45 mm) steel thickness, drywall stud.

   d. Minimum Delivered Thickness: Designation: STX-20 gauge, 0.0329 inches (0.84 mm) steel thickness, drywall stud.

2. Web Sizes: As indicated on drawings.

3. Flanges: Equal lengths 1-1/4 inches (.32 mm).

4. Section Properties: Manufacturer's standard section properties.

B. Runner Track: Cold-formed galvanized steel in conformance with AISI Specifications for Design of Cold-formed Steel Structural Members; Dietrich Big "D" drywall runner track.

1. Thickness equal to stud thickness minimum or heavier per design requirements.

a. Designation and size as indicated on the drawings.

b. Section Properties: Manufacturer's standard section properties.

C. Deflection Track: Cold-formed galvanized steel in conformance with AISI Specifications for Design of Cold-formed Steel Members.

1. Designation and size as indicated on the drawings.

2. Minimum Delivered Thickness: As indicated on the drawings.

3. Standard leg 2-1/2 inches.

4. Standard Vertical Slot of 1-1/2 inches in leg.

5. Minimum yield strength of 50 k.s.i. in 16 gauge and heavier and minimum yield strength of 33 k.s.i. in 18 gauge and lighter.

D. Hemmed Runner Track: Cold-formed galvanized steel sheet in conformance with AISI Specifications for Design of Cold-formed Steel Structural Members, Dietrich Big "D" drywall hemmed runner track:

1. Designation and size as indicated on the drawings.

2. Track Sizes: As indicated on the drawings.

3. Section Properties: Manufacturer's standard section properties.

E. Furring Channel: Cold-formed galvanized steel in conformance with AISI Specifications for Design of Cold-formed Steel Structural Members; Dietrich Big "D" furring channel:

1. Designation and size as indicated on the drawings.

F. U Channel: Cold-formed galvanized steel; Dietrich Big "D" U channel:

1. Designation and size as indicated on the drawings.

G. Metal Trims: Cold-formed galvanized steel.

1. Type and size as indicated on the drawings.

H. Framing Component Accessories: Provide the following accessories as required for a complete system.

1. EasyClip® Clip Angle or approved equal.

2. Angles.

3. Backing Strip.

I. Fasteners: Self-drilling, self-tapping screws; steel, complying with ASTM C 1513; galvanized coating, plated or oil-phosphate coated complying with ASTM B 633 as needed for required corrosion resistance.

J. Non-Hardening, Flexible Sealant: Latex acrylic.

2.03 MATERIALS

A. Cold-Formed Steel: Complying with ASTM A 1003/A 1003M; unless indicated otherwise.

B. Galvanized Coating: G40 coating weight minimum, complying with ASTM C 645.

2.04 FABRICATION

A. General: Framing components may be preassembled into panels prior to erecting.

B. Fabricate panels square, with components attached in a manner so as to prevent racking or distortion.

C. Cut all framing components squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Hold members positively in place until properly fastened.

D. Fasteners: Fasten components using self-tapping screws or welding.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation, inspect previous work of all other trades. Verify that all work is complete and accurate to the point where this installation may properly proceed in strict accordance with framing shop drawings.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 ERECTION

A. Install in accordance with requirements of ASTM C 754 standards and manufacturer’s instructions.

B. Framing Installation:

1. Erect framing and panels plumb, level and square in strict accordance with approved drawings.
2. Handle and lift prefabricated panels in a manner to not cause distortion in any member.
3. Anchor runner track securely to the supporting structure. Install concrete anchors only after full compressive strength has been achieved.
4. Butt all track joints. Securely anchor abutting pieces of track to a common structural element, or splice them together.
5. Align and plumb studs, and securely attach to the flanges or webs of both upper and lower tracks.
6. Attach wall stud bridging in a manner to prevent stud rotation. Space bridging rows according to manufacturer's recommendations.
7. Provided temporary bracing until erection is completed.
8. Where indicated in the drawings, provide for structural vertical movement using means in accordance with manufacturer's recommendations.

3.03 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09265 – GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Gypsum board and related items necessary to complete the Project as indicated on the Drawings and specified herein. This Section also includes but is not limited to:

1. Gypsum board and accessories.
2. Gypsum board finishing.
3. Trim and accessories.

B. Related Sections:

1. Section 07213 – Building Insulation.
2. Section 07841 – Penetration Firestopping.
3. Section 07920 – Joint Sealants.
4. Section 08830 – Mirrors.
5. Section 09110 – Non-Load Bearing Wall Framing.
6. Section 09511 – Acoustical Panel Ceilings.
7. Section 09651 – Resilient Flooring.
8. Section 09720 – Wall Covering.
9. Section 10260 – Corner Guards.
10. Section 09900 - Painting.
11. Section 10400 – Signage.
12. Section 10810 –Toilet Accessories.

1.02 REFERENCES

A. The latest editions of the following references, codes and standards are hereby made a part of this Section and gypsum installation work shall conform to applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained herein shall be construed as permitting work

that is contrary to code requirements. In case of conflicts among references, codes, standards and this Section, the most stringent shall apply:

B. Gypsum Association GA216, “Recommended Specifications for the Application and Finishing of Gypsum Board”.

1.03 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Product Data: Submit manufacturer's specifications and installation instructions with Project conditions and materials clearly identified or detailed for each required system.

C. Material Safety Data: Submit MSDS sheets.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver material to site promptly without undue exposure to weather.
2. Deliver materials in manufacturer's original sealed containers or bundles with labels legible and intact identifying brand name and contents.

B. Storage:

1. Store above ground in dry, ventilated space.
2. Protect materials from soiling, rusting and damage.
3. Store board to be directly applied to masonry walls at 70 degrees Fahrenheit for 24 hours prior to installation.

1.05 ENVIRONMENTAL CONDITIONS

A. Do not install gypsum board when ambient temperature is below 40 degrees Fahrenheit.

B. For adhesive attachment of gypsum board, and for finishing of gypsum board maintain ambient temperature above 50 degrees Fahrenheit for one week prior to attachment or joint treatment until joint treatment is complete and dry.

1.06 PROTECTION

A. Protect adjacent finishes and surfaces from damage or stains during installation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All gypsum board and accessories shall be the product of a single manufacturer. Materials listed herein, unless otherwise designated, are United States Gypsum Company (USG) and require no further approval as to manufacturer or catalog number. Other manufacturers of equal quality may be substituted if approved by the WHFD AND/OR PROJECT MANAGER. The burden of proof of equality shall be borne by the Contractor.

2.02 BOARD MATERIALS

A. Gypsum Board:

1. ASTM C36 or ASTM C1396/C1396M, Type X, unless otherwise indicated on drawings.
2. For Fire Rated Assemblies, UL Type Designation: SCX or C, unless otherwise indicated on drawings.
3. Edges: Tapered.
4. Thickness: 5/8” unless otherwise indicated on drawings.

B. Ceiling Board:

1. ASTM C36 or ASTM C1396/C1396M, Type X non-sag type.
2. For Fire Rated Assemblies, UL Type Designation: SCX or C.
3. Thickness: 5/8”.

C. Water-Resistant Gypsum Board:

1. ASTM C630 or ASTM C1396/C1396M, Type X, water-resistant gypsum wallboard and exterior gypsum soffit board.
2. For Fire Rated Assemblies, UL Type Designation: SCX or C.
3. Edges: Tapered.
4. Thickness: 5/8”, unless otherwise indicated.

2.03 ACCESSORIES

A. Metal Trim for Gypsum Board:

1. Conform to profiles and dimensions indicated.
2. Material for interior Work: Galvanized steel, 26 gage minimum.
3. Corner beads: Dur-A-Bead No. 103 by USG or equal.
4. Casing beads: 200A by USG or equal.
5. Control joints:
    a. Roll-formed zinc with perforated flanges.
    b. Size: 1 ¾" wide with ¼" wide center channel.
    c. Provide with removable tape strip over channel.
    d. Acceptable product: USG No. 093 or equal.

B. Adhesive and Joint Treatment Materials:
1. Conform to requirements of ASTM C475.
2. Joint compounds:
    a. Drying-type (ready mixed): Sheetrock taping joint compound and topping joint compound, Sheetrock all purpose joint compound or equal.
    b. Setting type (chemically hardening): Sheetrock setting type joint compound or equal.
    c. Select Joint compound with laminating capabilities and the ability to withstand moisture.
3. Reinforcing joint tape:
    a. ASTM C475, 2" nominal width.
    b. For water-resistant gypsum board, backer board and veneer base, provide fiberglass tape as recommended by board manufacturer and ceramic tile setting material manufacturer.

C. Gypsum Board Screws:
1. Comply with ASTM C1002.
2. For non-rated systems, 1-1/4" or 1-3/8" nails are acceptable.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Prior to starting any work under this Section, carefully examine all substrates and adjoining construction and conditions under which Work is to be installed. Do not proceed with installation until conditions are suitable.

3.02 GENERAL INSTALLATION

A. Install in accordance with reference standards and manufacturer's instructions.

B. Install framing to comply with ASTM C840 requirements that apply to framing installation.

C. Install supplementary framing, blocking and bracing at terminations in gypsum board assemblies to support fixtures, equipment, heavy trim, grab bars, toilet accessories, furnishings or similar construction.

3.03 BOARD INSTALLATION

A. Single Layer Gypsum Board on Metal Framing:

1. Loosely butt gypsum board joints together and neatly fit.
2. Do not place butt ends against tapered edges.
3. Maximum allowable gap at end joints: 1/8".
4. Stagger joints on opposite sides of partitions.
5. Apply ceiling boards first where gypsum board ceilings and wall occur.
6. Cut openings in gypsum board to fit electrical outlets, plumbing, light fixtures and piping snugly and small enough to be covered by plates and escutcheons. Cut both face and back paper.
7. Screw or nail board in place securely with fasteners spaced according to manufacturer's recommendations.

B. Direct Gypsum Board Adhesive Application:

1. Apply adhesive with manufacturer's recommended spreader to backs of gypsum boards in band of four (4) beads each to center of each board and along edges.
2. Position boards vertically and press firmly in place to insure good bond.

3. Fasten top and bottom of board if required.

C. Water Resistant Gypsum Board:

1. Complete plumbing rough-in before gypsum board panels are erected.
2. Separate gypsum panels from rough-in and fixtures by ¼" space.
3. Make necessary cut-outs and seal cut or exposed panel edges with thinned down ceramic tile adhesive or with waterproof flexible sealant, as recommended by gypsum board manufacturer.
4. Install water-resistant board horizontally.
5. Do not install water-resistant board directly over vapor retarder.
6. Prior to tile application, fill openings around pipes, fittings, fixtures, interior angles and other penetrations with waterproof flexible sealant, as recommended by gypsum board manufacturer. Do not fill ¼" gap at bottom of panels.

D. Ceilings:

1. Install gypsum base sheets with long direction at right angles to furring with end joints occurring over joists or furring.
2. Stagger end joints.
3. Install ceiling boards prior to adjoining partition boards where feasible.
4. Fasten at not less than 12" on center.

3.04 ACCESSORY INSTALLATION

A. Trim:

1. Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.
2. Install metal corner beads at external corners.
3. Install metal casing bead trim whenever edge of gypsum board would otherwise be exposed or semi-exposed.

B. Control Joints:

1. Install control joints at junction of gypsum board partitions with walls or

partitions of other finish material.

2. Install control joints within long runs of partitions, ceilings or soffits at approximately 30’-0” on center or as indicated.

3. Where gypsum board is vertically continuous, as at stairwells, provide horizontal control joints at each floor level.

C. Special Trim: Install as indicated on Drawings and in accordance with manufacturer’s instructions.

3.05 FINISHING

A. Provide levels of gypsum board finish for locations as follows, in accordance with Gypsum Association GA 214, “Recommended Specification: Levels of Gypsum Board Finish”.

1. Level 1: Ceiling plenum areas and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.

2. Level 2: Gypsum board substrate at tile or stone, except remove tool marks and ridges.

3. Level 3: Gypsum board surfaces, except where another finish level is indicated.

4. Level 4 & 5: Gypsum board surfaces in public access and patient areas.

B. Interior Gypsum Board:

1. Pre-fill:

a. Use setting-type joint compound. Mix joint compound according to manufacturer’s directions.

b. Fill joints between boards flush to top of eased or beveled edge.

c. Wipe off excess compound and allow compound to harden.

2. Taping (Level 1):

a. Butter taping compound into inside corners and joints.

b. Center tape over joints and press down into fresh compound.

c. Remove excess compound.

d. Tape joints of gypsum board above suspended ceilings.

3. First coat (Level 2):

   a. Use taping or all-purpose drying-type compound.

   b. Immediately after bedding tape, apply skim coat of compound and allow to dry completely in accordance with manufacturer's instructions.

   c. Apply first coat of compound over flanges of trim and accessories, and over exposed fastener heads and finish level with board surface.

4. Second coat (Level 3): After first coat treatment is dried, apply second coat of compound over tape and trim, feathering compound 2" beyond edge of first coat.

5. Third coat (Level 4):

   a. After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 2" beyond edge of second coat.

   b. Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.

6. Skim coat (Level 5):

   a. Apply skim coat of topping or all-purpose drying-type compound over exposed surfaces of gypsum board according to manufacturer's directions.

   b. After skim coat has dried, touch-up and sand to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.

C. Water-Resistant Gypsum Board: Treat fastener heads and joints with setting-type joint compound.

1. For joint to be covered with tile, apply tape and joint compound bedding coat and skim coat only; do not apply finish coats.

2. Do not crown joint or leave excess compound on panels.

3. Remove tool marks and ridges.

4. For fastener heads to be covered with tile, apply one coat of joint compound.

3.06 ADJUSTING

Correct damage and defects which may telegraph through finish work. Leave Work smooth and uniform.

END OF SECTION

SECTION 09511 - ACOUSTICAL PANEL CEILING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices.

C. Related Sections include the following:

1. Section 09110 - Non-Load Bearing Wall Framing.

2. Section 09265 - Gypsum Board Assemblies.

1.03 RELATED REQUIREMENTS:

1. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

2. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

3. ASTM E84 - Standard Method for Surface Burning Characteristics of Building Materials.

4. ASTM E580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

5. 2006 International Building Code - Section 1613, 1704, 1705, & 1706.

6. ASCE/SEI American Society of Civil Engineers 7-10: Minimum Design Loads for Buildings and Other Structures.

7. CISCA Ceilings & Interior Systems Construction Association.

    a. Ceiling Systems Handbook

    b. Seismic Construction Handbook

8. International Code Council ICC-ES Evaluation Report ESR-1222 issued December 2016

1.04 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.05 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

    1. Ceiling suspension system members.

    2. Method of attaching hangers to building structure.

        a. Furnish layouts for clips, and other ceiling attachment devices whose installation is specified in other Sections.

    3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

    4. Minimum Drawing Scale: 1/8 inch = 1 foot.

C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

    1. Acoustical Panel: Set of 6-inch- (150-mm-) square samples of each type, color, pattern, and texture.

    2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- (300-mm-) long Samples of each type, finish, and color.

D. Manufacturers' product data for sealants, including printed statement of VOC content and material safety data sheets.

E. Maintenance Data: For finishes to include in maintenance manuals.

F. Manufacturer’s Warranty.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

B. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.

2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."

C. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 – General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.09 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.

1.10 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 panels equal to 10 percent of quantity installed.

2. Suspension System Components: Quantity of each exposed component equal to 10 percent of quantity installed.

3. Hold-Down Clips: Equal to 10 percent of quantity installed.

PART 2 - PRODUCTS

2.01 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match or closely resemble existing appearance characteristics of the predominant panel used in the Hospital.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Prime Consultant from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.02 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Eclipse as manufactured by USG Interiors, LLC.

1. See drawings for material and color.

2. Classification: Provide ceiling panels complying with ASTM E 1264 for type, form and pattern as follows:

a. Type: III, mineral base with painted finish

b. Form: 1, Nodular

c. Pattern: EI, light texture embossed

3. Color: Flat White 050.

4. LR: Not less than 0.86, ASTM E 1477.

5. NRC: Not less than 0.75, ASTM C 423.

6. CAC: Not less than 35.

7. Edge/Joint Detail: SQ Square.

8. Suspension Grid Width: DX/DXL, 15/16 inch (24 mm).

9. Panel Thickness: 7/8 inch (22 mm).

10. Modular Size: 24 by 24 inches (610 by 610 mm).

11. VOC Emissions: Third party (GREENGUARD Gold) certified for low-emitting performance, meets California Department of Department of Public Health's (CDPH) Standard Method v1.1-2010 (CA Section 01350). 'Certificates of Compliance' for Low VOC Emissions are available on usg.com and at productguide.ulenvironment.com.

12. ClimaPlus™ 30 year limited system warranty. Contains a broad spectrum antimicrobial additive on the face and back of the panel that provides resistance against the growth of mold and mildew. Includes sag resistance performance.

2.03 SEISMIC PERFORMANCE REQUIREMENTS

A. Seismic Performance: Suspended grids and ceiling panels shall be installed in accordance to ASTM C636, ASTM E580 (including approved alternate methods).

B. Ceiling design shall comply with ASCE/SEI American Society of Civil Engineers 7-10: Minimum Design Loads for Buildings and Other Structures

2.04 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted

by a qualified testing and inspecting agency.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

2. Size: Select wire diameter so its 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 0.106-inch- (2.69-mm-) diameter wire.

E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place

2.05 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Narrow Face, Capped, Double Web, Cold Rolled Steel Suspension System: Main and Cross Tees as defined by ASTM C635, commercial quality pretreated and painted hot-dipped galvanized cold-rolled steel, exposed surfaces prefinished in manufacturer's standard corrosion resistant enamel paint finish.

1. Basis of Design: Subject to compliance with project requirements, the design is based on the following: USG Interiors, LLC**, "**USG DONN® Brand DX/DXL™ 15/16" Acoustical Suspension System**".**

2. Structural Classification: heavy duty.

3. Tee Profile: Narrow Face 15/16” (22 mm) wide.

4. Tee Height: 1.64” (42 mm).

5. Grid Module: As noted on drawings.

6. Fire Rating: [Class A].
7. Color: standard flat white 050.
8. Seismic Criteria:
    a. Reference Seismic standards per ASTM E580 and CISCA guidelines.
    b. Seismic Design Category as defined by the IBC (International Building Code): D.

B. Accessories.

1. Wall molding: Inside Corner: Field-mitered joints at wall molding. Prefabricated corner cap; formed to 90° angle; hemmed edge; size and finish to match wall molding. Outside Corner: Prefabricated corner cap; formed to 90° angle; hemmed edge; size and finish to match wall molding.
    a. Angle shape; 2 in. mounting flange by 1 in. vertical flange; hemmed edges; exposed surface pre-finished to match suspension system components.
2. Shadow Molding: Formed steel section; exposed surfaces prefinished to match suspension system components.
    a. 1 1/4” exposed flange; 9/32” x 3/4” reveal; 7/8” vertical flange; Available Product: MS274.
3. Seismic Attachment Clip: Used to attach tees ends to perimeter angle for seismic design C D E F categories.
    a. Available products: ACM7.
4. Molding Attachment Clip: 2 in. thick x 1/2 in. thick x 1-5/8 in.; for Fineline Suspension System. Used to attach cross tees and main tees to walls/ wall molding.
    a. Molding Attachment Clip: 9/16 in. thick for SQ panels or FL panels, Available products: MAC2
5. Stabilizer bars:
    a. Panels with a length equal to or greater than 60” shall require stabilizer bars at the midpoint to secure suspension grid to the ceiling panel. Reference USG ceiling literature for more information.

6. Seismic Separation joint accessories: Tee sleeves to accommodate movement: Snap fit sleeve, prefinished to match suspension system components.
    a. For 15/16” DX/DXL Suspension System; Available products: TFS-1.
7. Four way Seismic Separation joint clip: Connects 4 way intersection: Snap fit sleeve with optional screw/fixing holes.
    a. Available products: DH4.
8. Compression Posts for bracing of ceiling applications:
    a. Available products: Provide telescoping sizes as required, i.e. Adjustable 18” to 30” [VSA 18/30], Adjustable 30” to 48” [VSA 30/48], Adjustable 48” to 84” [VSA 48/84], Adjustable 84” to 102” [VSA 84/102], Adjustable 102” to 120” [VSA 102/120], Adjustable 120” to 144” [VSA 102/144].

C. Suspension System Attachment devices.
1. Hanger Wire: Galvanized carbon steel; soft temper; pre-stretched; yield stress load at least three times the design load but not less than 12-gauge.
    a. Spacing and gauge per IBC, UL and CISCA design.
    b. Supplied and installed by ceilings subcontractor.

D. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

E. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 0.106-inch- (2.69-mm-) diameter wire.

F. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.
1. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from

sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

a. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.

b. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.06 ACOUSTICAL SEALANT

A. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.

b. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical Sealant for Concealed Joints:

a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.

b. Pecora Corporation; BA-98.

c. Tremco, Inc.; Tremco Acoustical Sealant.

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

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

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and

appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors.
6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
7. Do not attach hangers to steel deck tabs.
8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of ` (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.04 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09651 – RESILIENT FLOORING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Luxury Vinyl Tile Flooring.
2. Rubber Flooring.
3. Resilient Base.
4. Moisture Mitigation System.

1.03 RELATED SECTIONS

A. Section 01450 – Moisture Vapor & Alkalinity Testing.

B. Section 03300 – Cast-In-Place Concrete

C. Section 09260 – Gypsum Board Assemblies.

D. Section 09720 – Wall Covering.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification:

1. Flooring: Full-size units of each color and pattern of flooring required. If flooring specified is not a unit size, provide minimum 12” square sample.
2. For each type of base product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

C. Safety Data Sheets (SDS) available for adhesives, moisture mitigation systems, primers, patching/leveling compounds, floor finishes (polishes), and cleaning agents.

D. Product Schedule: For flooring and resilient base.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For each type of flooring to include in maintenance manuals.

G. Manufacturer's Warranty.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for flooring installation indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store flooring material on flat surfaces.

1.07 PROJECT CONDITIONS

A. For Luxury Vinyl Tile Flooring: Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C), in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.

2. During installation.

3. 48 hours after installation.

B. For Rubber Sheet Flooring: The installation area must be fully enclosed, weather tight, and climate controlled between 63 deg F and 75 deg F and 40% to 60%

ambient relative humidity (RH). Dew point must be avoided. The substrate must be at least 5°F above dew point to be considered acceptable:

4. 48 hours before installation.
5. During installation.
6. 72 hours after installation (Do not use gas fueled blowers).

C. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

D. Close spaces to traffic during flooring installation.

E. Close spaces to traffic for 48 hours after flooring installation.

F. Install flooring after other finishing operations, including painting, have been completed.

1.08 EXTRA 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. Flooring: Furnish quantity of flooring units equal to 5% of amount installed of each type, color, and pattern of flooring.
2. Resilient Base: Furnish not less than 10 linear feet (3 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.01 LUXURY VINYL TILE FLOORING

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following:

1. Armstrong Flooring, Inc.
   a. Natural Creations Classics: Arborart
   b. ASTM F1700: Class III, Type B – Embossed Surface.
2. No substitutions.

B. See drawings for material and color.

2.02 RUBBER SHEET FLOORING

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following:

1. Nora Systems, Inc.

a. Noraplan Valua 3.0 mm, Articles 173A & 175A

b. ASTM F1859: Type 1

c. Limited Wear Warranty: 5 years

2. No substitutions.

B. See drawings for material and color.

2.03 RESILIENT BASE:

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

1. Armstrong Flooring, Inc.

a. Color-Integrated Wall Base with Matte Finish.

b. Type: TP – Thermoplastic Rubber.

c. Group: 1 – Solid.

d. Style: B – Cove.

e. Size: 1/8” (3.2 mm) thick, 6 in (15.24 cm) high.

2. Mannington Commercial

a. Burkebase (Non-Ortho Phthalate) with Matte Finish.

b. Type: TP – Thermoplastic Rubber.

c. Group: 1.

d. Style: Coved.

e. Size: 1/8” (3.2 mm) thick, 6 in (15.24 cm) high No substitutions.

B. Resilient Base Standard: ASTM F 1861.

C. See drawings for material and color.

2.04 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Moisture Mitigation System

1. Manufacturer: Armstrong Flooring Inc., 2500 Columbia Avenue, Lancaster, PA 17603, www.armstrongflooring.com/commercial, for Armstrong Flooring.

2. Product: S-452 Seal Strong, Solvent free two component liquid epoxy to ASTM F3010.

a. Permeance to ASTM E96: <0.1 perm.

b. VOC content: <100 g/L (A and B combined); calculated, SCAQMD 1113.

3. Manufacturer: Aquafin Inc., 505 Blue Ball Rd. #160, Elkton, MD 21921, www.aquafin.net, for Nora Flooring.

a. Product: Vaportight Coat – SG2, Oil & Water Vapor Barrier Coating, two component epoxy.

i. Permeance to ASTM E96: .83 perms.

ii. VOC content: 47 g/L.

b. Product: Vaportight Coat – SG3, 100% Solids, Moisture Mitigation and pH Barrier Coating, two component clear epoxy.

i. Permeance to ASTM E96: 0.10 @ 16 mils.

ii. VOC content: 0 g/L.

C. Adhesives:

1. Flooring: Water-resistant type recommended by manufacturer to suit flooring and substrate conditions indicated.

a. Verify with manufacturer, compatibility of surface applied vapor reduction system with adhesive.

b. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Luxury Vinyl Tile Adhesives: Not more than 50 g/L.

b. Rubber Sheet Flooring Adhesives: Not more than 60 g/L.

2. Resilient Base: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

a. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

D. Heat Welds:

1. Description: EVA-copolymer with pigments for sealing continuous floor coverings.

2. Product: Nora Heat Weld, Article 946

3. Color: Match Flooring.

4. VOC: <12 g/L, in compliance with SCAQMD Rule 1168.

E. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. 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 flooring.

C. Substrate Moisture: Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point comply with manufacturer's recommendations.

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

3.02 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

3. Moisture, Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

4. Moisture Mitigation System: Apply vapor barrier (2-component epoxy) to substrate when moisture content exceeds manufacturer’s recommendations for installing resilient flooring.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install flooring until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.03 LUXURY VINYL TILE INSTALLATION

A. Comply with the latest edition of the manufacturer's written instructions for installing the floor tiles.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis in pattern indicated.

C. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

D. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

F. Adhere floor tiles to flooring 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.

3.04 RUBBER SHEET FLOORING INSTALLATION

A. Supply a safe, climate controlled building and subfloor as detailed in the manufacturer's installation guide.

B. A subfloor that meets the requirements of ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring is required, or as detailed in the manufacturer's installation guide.

C. A secure storage area that is fully enclosed, weather tight, and climate controlled between 63°F and 75°F and 40% to 60% ambient relative humidity (RH) for at least 48-hours prior and during the installation, so the flooring contractor can acclimate all materials.

D. An installation area that is fully enclosed, weather tight, and climate controlled between 63°F and 75° and 40% to 60% ambient relative humidity (RH) for at least 48-hours prior, during, and 72-hours after installation (do not use gas fueled blowers).

E. Areas with direct prolonged exposure to sunlight should be protected with the use of Low E glass doors, windows or facades that reduce the UV transmissions to less than 1%.

F. Areas of the flooring subjected to direct sunlight, for example through doors or windows, must be covered using blind, curtains, cardboard or similar materials for 24-hours before, during, and for a period of 72-hours after the installation to allow “wet” adhesives to cure. Do not allow traffic when using wet set adhesives for a minimum of 12-hours and prohibit rolling loads for 72-hours. When using a dry adhesive method, the flooring can be trafficked immediately with no restrictions, consult with manufacturer. All flooring must be protected from damage during construction operations using Masonite, plywood or a similar product. Before laying the panels the flooring surface must be free of all debris. Lay panels so that they are edge to edge and tape the joints to prevent movement and debris entrapment. Inspect the flooring before covering and after removal for final acceptance.

G. Conduct post-installation cleaning after 72-hours for wet set adhesives. Conduct post-installation cleaning immediately for installations using dry adhesive methods. Refer to the manufacturer’s maintenance guide for product specific details.

H. Provide trained installers that have at least one of the following:

1. Approved by the manufacturer or INSTALL (International Standards & Training Alliance) certified for the requirements of the project.

2. An effective installation manager to manage the project, installers, and ensure that all of the required procedures are followed as detailed in the manufacturer’s installation guide.

I. Follow all requirements in the manufacturer’s installation guide.

3.05 RESILIENT BASE INSTALLATION

A. Comply with latest edition of the manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, wall coverings, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams, with tops of adjacent pieces aligned, and with inside corners fabricated from base materials that are mitered or coped.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible.

3.06 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of flooring.

B. Perform the following operations immediately after completing flooring installation:

1. Remove adhesive and other blemishes from exposed surfaces.

2. Sweep and vacuum surfaces thoroughly.

3. Damp-mop surfaces to remove marks and soil.

C. Protect flooring products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from flooring surfaces before applying liquid floor polish.

1. Apply two coats.

END OF SECTION

SECTION 09720 – WALL COVERING

PART 1 - GENERAL

1.01 SUMMARY

A. Rigid vinyl sheet for wall protection and decoration.

B. Related Sections:

1. Section 07920 – Joint Sealants.
2. Section 09265 – Gypsum Board Assemblies.
3. Section 08830 – Mirrors.
4. Section 09650 – Resilient Flooring.
5. Section 10260 – Corner Guards.
6. Section 10400 – Signage.
7. Section 10810 – Toilet Accessories.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

B. National Fire Protection Association (NFPA)

C. Underwriters Laboratory (UL)

D. International Building Code (IBC)

1.03 SYSTEM DESCRIPTION

A. Performance Requirements: Provide Rigid Vinyl Sheet systems that conform to the following requirements of regulatory agencies and the quality control of the manufacturer.

1. Fire Performance Characteristics: Provide UL Classified Rigid Vinyl Sheet conforming with the NFPA Class A fire rating. Surface burning characteristics as determined by UL-723 (ASTM E-84) for Rigid Vinyl Sheet and adhesive.
    a. Adhesive shall be a maximum flame spread of 20 and a maximum smoke developed of 350 for .060" (1.5mm) thick material.
2. Self-Extinguishing: Provide Rigid Vinyl Sheet with a CC1 classification, as

tested in accordance with the procedures specified in ASTM D-635-74, Standard Test Method for Rate of Burning.

3. Impact Strength: Provide Rigid Vinyl Sheet that has an Impact Strength of 30.4 ft-lbs/ inch of thickness as tested in accordance with the procedures specified in ASTM D-256-90b, Impact Resistance of Plastics.
4. Chemical and Stain Resistance: Provide Rigid Vinyl Sheet that shows resistance to stain when tested in accordance with applicable provisions of ASTM D-543.
5. GREENGUARD Certified: Provide GREENGUARD Certified material. Profiles shall meet the requirements of GREENGUARD Certification Standards for Low-Emitting Products.
6. Fungal and Bacterial Resistance: Provide rigid vinyl that does not support fungal or bacterial growth as tested in accordance with ASTM G-21 and ASTM G-22.
7. Color Consistency: Provide components matched in accordance with SAE J-1545 - (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.

1.04 SUBMITTALS

A. Product Data: Manufacturer's printed product data for each type of Rigid Vinyl Sheet specified.

B. Samples: Verification samples, 8" (203mm) square, of each type and color indicated.

C. Manufacturer's Installation Instruction: Manufacturer’s printed installation instructions for Rigid Vinyl Sheet.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unopened factory packaging to the jobsite

B. Inspect materials at delivery to assure that specified products have been received.

C. Store in original packaging in a climate controlled location away from direct sunlight.

1.06 PROJECT CONDITIONS

A. Environmental Requirements: Products must be installed in an interior climate controlled environment.

1.07 WARRANTY

A. Standard manufacturer's Limited Lifetime Warranty against material and manufacturing defects.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. IPC Door and Wall Protection Systems, InPro Corporation, PO Box 406 Muskego, WI 53150 USA; Telephone: 800.222.5556, Fax: 888.715.8407, www.inprocorp.com

B. Provide all Rigid Vinyl Sheet and wall protection accessories from a single source.

2.02 MANUFACTURED UNITS

A. Rigid Vinyl Sheet

1. Palladium® Rigid Vinyl Sheet Options
    a. Item #: 405
    b. Dimensions: 4'x8' (1.22m x 2.44m)
    c. Thickness: .040" = 3/64" (1mm), standard
    d. Backing - unbacked
2. Accessories:
    a. Vinyl
        i. 407 Top Cap; Length: 8' (2.44m) standard, 10' (3.04m) available
    b. Color Matched Caulk

2.03 MATERIALS

A. Vinyl: Rigid Vinyl Sheet shall be manufactured from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth).

2.04 ACCESSORIES

A. Top caps shall be made of extruded PVC.

2.05 FINISHES

A. Color or pattern of Rigid Vinyl Sheet to be selected by the architect from the manufacturer's finish selection. Surface shall have a velvet texture.

B. Vinyl Accessories: Top caps shall be of a color matching Rigid Vinyl Sheet.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions in which the rigid vinyl sheet will be installed.

1. Complete all finishing operations, including painting, before beginning installation of rigid vinyl sheet materials.

B. Wall surface shall be dry and free from dirt, grease and loose paint.

3.02 PREPARATION

A. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

3.03 INSTALLATION

A. General: Locate the rigid vinyl sheet as indicated on the drawings for the appropriate substrate and in compliance with the manufacturer's installation instructions. Install level and plumb at the height indicated on the drawings.

B. Installation of rigid vinyl sheet

1. Adhere to substrate with manufacturer recommended freeze-thaw stable, nonflammable, high strength, water based adhesive that trowels on and allows approximately 20 minutes working time before firming.

3.04 CLEANING

A. At completion of the installation, clean surfaces in accordance with the manufacturer's maintenance instructions.

END OF SECTION

SECTION 09900 – PAINTING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, DOE representative will select from standard colors and finishes available.

1. Interior and Exterior surfaces scheduled to be finished.

2. Non Ferrous metals, plated or factory finished items specifically noted to be painted or when such items occur as accessories and appurtenance to surfaces required to be painted.

C. Surfaces not to be finished, unless otherwise indicated.

1. Concrete floors, paving walks stairs and textured concrete. Other concrete surfaces scheduled not to be painted.

2. Finish hardware, unless prime coated.

3. Glass, plastic laminate, and ceramic tile.

4. Acoustical ceilings, unless scheduled to be painted.

5. Integrally colored plaster or EIFS systems.

6. Flooring and floor coverings.

7. Plumbing and lighting fixtures, and electrical device plates.

8. Movable furniture such as portable bookshelves, cubicles and cabinets.

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:
    a. Architectural woodwork.
    b. Acoustical wall panels.
    c. Metal, phenolic, or plastic toilet enclosures.
    d. Metal, phenolic, or plastic lockers.
    e. Elevator entrance doors and frames.
    f. Elevator equipment.
    g. Finished mechanical and electrical equipment.
    h. Light fixtures.
2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    a. Foundation spaces.
    b. Furred areas.
    c. Ceiling plenums.
    d. Utility tunnels.
    e. Pipe spaces.
    f. Duct shafts.
    g. Elevator shafts.
3. Finished metal surfaces include the following:
    a. Anodized aluminum.
    b. Stainless steel.
    c. Chromium plate.
    d. Copper and copper alloys.
    e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
    a. Valve and damper operators.

b. Linkages.

c. Sensing devices.

d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.02 RELATED SECTIONS

A. Section 01450 – Moisture Vapor & Alkalinity Testing.

B. Section 05120 – Structural Steel Framing.

C. Section 07240 – Direct-Applied Finish System.

D. Section 07620 – Sheet Metal Flashing & Trim.

E. Section 08100 – Hollow Metal Door Frames.

F. Section 08900 – Louvers.

G. Section 09265 – Gypsum Board Assemblies.

H. Division 15 – Mechanical.

I. Division 16 – Electrical.

1.03 REFERENCES

A. ASTM D16 - Definition of terms relating to Paint, Varnish, Lacquer and Related Products.

B. ASTM D2016 - Test Method for Moisture Content of Wood.

C. MPI (Master Painter's Institute) - Approved Product List.

D. PCDA (Painting and Decorating Contractors of America - Painting - Architectural Specification Manual.

E. PCA (Portland Cement Association) - Painting Concrete.

F. SSPC (Steel Structures Painting Council - Steel Structures Painting Manual)

1.04 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1.05 SUBMITTALS

A. Submit under the provisions of Section 001330 – Submittal Procedures.

B. Product Data:

1. Materials List: Provide an inclusive list of required patching and coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's name, product name and/or catalog number and general product classification.

    a. For products with premixed colors, provide manufacturer's standard color chips for selection by the WHFD AND/OR PROJECT MANAGER.

2. Manufacturer's Information: Provide data on all listed materials, including:

    a. Thinning and mixing instructions

    b. Application instructions and required mil film thicknesses.

    c. Manufacturer's Material Safety Data Sheets.

C. Certifications: Provide a letter certifying paints and coatings are free of asbestos, lead, zinc-chromate, strontium chromate, cadmium, and mercury and mercury compounds. Provide a letter certifying the amounts of mildewcide added by both the paint manufacturer and paint supplier. Provide a letter certifying that abrasive blast media are free of crystalline silica.

D. Schedule of Finishes: Provide finish schedule including paint spread rates required to achieve final dry film thickness indicated in the schedule.

E. Schedule of Operations: Provide a work schedule showing sequence of operation and installation dates.

F. Samples:

1. Match existing color and submit paint finish samples, 8.5" x 11" in size illustrating selected colors and textures for each selection. Divide sample in horizontal strips showing prime and overlapping second and finish coats. Show coat tinting. Prepare transparent finish samples on same material as that on which coating will be applied. Identify each sample.

G. Manufacturer's Instructions: Indicate special surface preparation procedures, and substrate conditions requiring special attention. Refer to Section 3.01.

H. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

I. Qualification Data: For Applicator.

J. Delivery Receipts: Provide 3 copies of the delivery receipt, signed by the user's representative, attesting to delivery of extra paint as required under 1.10.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

B. Applicator Qualifications: A firm or individual with experienced (a minimum of five years) in surface preparation and applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.07 REGULATORY REQUIREMENTS

A. Comply with State OSHL (Occupational Safety and Health Law) and pollution control regulations of the State Department of Health and EPA.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's brand name and lot number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions and coverage.
7. Color name and number.
8. VOC content.

B. Storage

1. Non-flammable Materials: Store materials not in use in tightly covered containers in a well-ventilated area. Maintain storage containers in a clean condition, free of foreign materials and residue.

2. Flammable Materials:

    a. Store in such a manner as to prevent damage. No paint material, empty cans, paint brushes and rollers may be stored in the building(s). Store these items in separate storage facilities away from the building(s). Contractor may furnish a separate job site storage structure, if the structure complies with the requirements of the local Fire Department. Keep the storage area shall clean. Lock any storage structures when not in use or when no visual supervision is possible.

    b. All rejected materials shall be removed from the job site immediately.

1.09 PROJECT CONDITIONS

A. Do not apply materials when surfaces and ambient temperatures are outside the ranges required by the paint product manufacturer. Do not apply exterior coatings during rain or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

B. Protect public, pedestrians and tenants from injury. Provided, erect and maintain safety barricades around scaffolds, hoists and where constriction operations create hazardous conditions.

C. Completed Work: Provide necessary protection for wet paint surfaces.

D. Protective Covering and Enclosures: Provide and install clean sanitary drop cloth or plastic sheets to protect furniture, equipment, floor and other areas that are not scheduled for treatment. Remove any paint applied to surfaces not scheduled for treatment.

E. Fire Safety: Contractor and its employees shall not to smoke in the vicinity of the paint storage area. Exercise precautions against fire at all times and remove waste rags, plastic (polyester sheets), empty cans, etc. from the site at the end of each day.

F. Safeguarding Property: Safeguard the work and also the property of the Hospital and other individuals in the vicinity of Contractor's work. Make good on any

damages and for losses to work or property caused by Contractor or its employee's negligence. Where damaged property cannot be cleaned and restored to its original condition (i.e. prior to being damaged) replace it with a new product of equal quality. No prorating or use of "used" products will be permitted.

1.10 EXTRA MATERIALS

A. Provide extra paint in each of the different colors, types and surface textures of exterior and interior paint to the user / school upon completion of the project. Paint shall be in unopened one gallon containers and labeled with color, type, texture, room locations, and date in addition to manufacturer's label.

1. Provide 5 gallons of each color for paint used over large areas, such as the exterior of the building and in the Laboratory.
2. Provide 1 gallon of each color for all other areas.
3. At project closeout, provide the color mixture name and code to the WHFD AND/OR PROJECT MANAGER for accurate future color matching.

1.11 WARRANTY

A. Provide a two year guarantee that the work performed under this section conforms to the contract requirements and is free of any defect of material or workmanship.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Mildewcide

1. Except for metal primers, provide primer and finish coats with suitable chemical mildewcide to the maximum amount of mildewcide per gallon of paint permitted by the mildewcide manufacturer without adversely affecting the quality of the paint, but not less than one ounce per gallon.

C. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names in the Paint Systems Schedule in Part 3 below to designate colors or materials, is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed products to be used.

2. Equivalency: Equivalent products to the specified products are listed in the Master Painter's Institute's "Architectural Painting Specification Manual."

3. Substitution: Requests for substitution of a product or product if a manufacturer is not on the "Approved Product List" will be evaluated for equivalency based on product test results per the test criteria of the Master Painter's Institute.

D. Colors: See the drawings.

E. Hazard Materials: Do not use paint or paint products containing asbestos, lead, mercury and mercury compounds, zinc chromates, strontium-chromate, and cadmium. Do not use abrasive blast media that contain crystalline silica.

2.02 MANUFACTURERS

A. Basis of Design: Benjamin Moore and Co., 101 Paragon Drive, Montvale, NJ 07645; Tel: 866-708-9181; Email: info@benjaminmoore.com; Web: www.benjaminmoore.com

B. No Substitutions.

2.03 MISCELLANEOUS MATERIALS

A. Provide patching and repair materials. Compatible with paint finishes and substrates. Use weather resistant materials for exterior surfaces and surfaces exposed to moisture.

B. Accessories

1. General: Provide other materials not specifically indicated but required to

achieve the finishes specified, of commercial quality.

2. Thinners: Thinning of paint shall be done using material recommended by the manufacturer. Mix proprietary products according to manufacturer's requirements. Do not use compound thinner, mineral oil, kerosene, refined linseed oil, or gasoline for thinning.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

2. Ensure that concrete and masonry surfaces are cured and dried to meet paint manufacturer's recommendations.

3. Start of painting will be construed as Applicator’s acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify WHFD AND/OR PROJECT MANAGER about anticipated problems when using the materials specified over substrates primed by others.

3.02 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove dust, oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.

D. Surface Preparation Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

1. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

2. Determine alkalinity and moisture content of surfaces by performing appropriate tests. Submit test results to WHFD AND/OR PROJECT MANAGER.

a. Prior to painting, concrete and masonry surfaces shall be allowed to cure and dry in accordance with the paint manufacturer's instructions and recommendations.

b. Efflorescence and laitance shall be removed from the surface.

c. Prior to paint application, interior and exterior concrete and masonry (including grout joints) scheduled to receive paint shall be tested to determine the alkalinity level of the surface. Testing shall be performed in strict accordance with the test kit manufacturer's instructions. Submit test results to the WHFD AND/OR PROJECT MANAGER.

d. Where the alkalinity level exceeds the pH level limit of the primer take one of the following three remedies at no additional cost to the Hospital:

i. If new concrete or masonry, wait until alkaline level has dropped

below the limit.

ii. Substitute a primer that is able to resist the measured alkalinity and that is compatible with the paint finish. Alkyd based primers and top-coats or epoxy ester primers shall not be used. Submit the substitute primer to the WHFD AND/OR PROJECT MANAGER for review.

iii. Neutralize the surface in accordance with the primer manufacturer's instructions to reduce the alkaline level. However, acid washing is not permitted where the surface has been finished with a cementitious coating.

E. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

3. Use only thinners approved by paint manufacturer and only within recommended limits.

F. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

1. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.

2. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.

3.03 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term “exposed surfaces” includes areas visible when permanent or built-in fixtures, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only unless otherwise noted.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.
11. Ensure primers are top coated within the times required by the paint manufacturers. Top coats not applied within the recoating window may be rejected.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a

smooth, even surface according to manufacturer's written instructions, sand between applications.

2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

4. Be aware of the requirements for, and restrictions on, spray painting contained in PROJECT CONDITIONS Paragraph.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.

2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

F. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

G. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque 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.

H. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

2. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.04 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.05 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by WHFD AND/OR PROJECT MANAGER.

B. Provide “Wet Paint” signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.06 EXTERIOR PAINT SCHEDULE

A. Concrete Unit Masonry: Provide the following finish systems over exterior concrete unit masonry:

1. Acrylic Finish: Two finish coats over a block filler.

a. Block Filler: Concrete unit masonry block filler: MPI #3.

b. Finish Coats: 2 coats exterior acrylic paint. MPI #15.

c. Finish Coat Gloss Level: match existing gloss level.

B. Exterior Gypsum Soffit Board: Provide the following finish systems over exterior gypsum soffit board:

1. Acrylic Finish: Two finish coats over a primer.

a. Primer: Exterior gypsum soffit board primer. MPI #17.

b. Finish Coats: 2 coats exterior acrylic paint. MPI #81.

c. Finish Coat Gloss Level: match existing gloss level.

C. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Acrylic Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer. MPI #134.

b. Finish Coat: Exterior acrylic paint. MPI #11.

c. Finish Coat Gloss Level: match existing gloss level.

3.07 INTERIOR PAINT SCHEDULE

A. Concrete Unit Masonry Previously Painted: Provide the following finish systems over interior concrete masonry:

1. Acrylic Finish: Two finish coats over a block filler.

a. Block Filler: Primer MPI #45; mils DFT.

b. Finish Coats: 2 coats interior acrylic paint. MPI #47

c. Finish Coat Gloss Level: match existing gloss level.

B. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Acrylic Finish: Two finish coats over a primer.

a. Primer: Interior gypsum board primer. MPI #45; mils DFT.

b. Finish Coats: 2 coats interior acrylic paint. MPI #47

c. Finish Coat Gloss Level: match existing gloss level.

C. Ferrous Metal: Provide the following finish systems over interior ferrous metal. Primer is not required on shop-primed items.

1. Acrylic Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer. MPI #134.

b. Finish Coat: Exterior acrylic paint. MPI #54.

c. Finish Coat Gloss Level: match existing gloss level.

END OF SECTION

DIVISION 10 – SPECIALTIES

SECTION 10260 – CORNER GUARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Corner guard system for wall protection.

B. Related Sections:

1. Section 09720 – Wall Covering.
2. Section 09110 – Non-Load Bearing Wall Framing.
3. Section 09265 – Gypsum Board Assemblies.

1.02 SECTION INCLUDES

A. High Impact Surface Mount Corner Guard System.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

B. National Fire Protection Association (NFPA)

C. Underwriters Laboratory (UL)

D. International Building Code (IBC)

1.04 SYSTEM DESCRIPTION

A. Performance Requirements: Provide corner guard system that conform to the following requirements of regulatory agencies and the quality control of the manufacturer's door and wall protection systems.

1. Fire Performance Characteristics: Provide UL Classified corner guards conforming with NFPA Class A fire rating. Surface burning characteristics, as determined by UL-723 (ASTM E-84), shall be flame spread of 10 and smoke development of 350 - 450.
2. Self-Extinguishing: Provide corner guards with a CC1 classification, as tested in accordance with the procedures specified in ASTM D-635-74, Standard Test Method for Rate of Burning.

3. Impact Strength: Provide rigid vinyl profile materials that have an Impact Strength of 30.2 ft-lbs/inch of thickness as tested in accordance with the procedures specified in ASTM D-256-90b, Impact Resistance of Plastics.

4. System Impact Resistance: Provide a corner guard system that resists an impact of 153.9 ft-lbs while producing no visual blemishes upon the vinyl cover surface and no deformations in the vinyl retainers, as tested in accordance with the applicable provisions of ASTM F 476-84, paragraph 18, Impact Test.

5. GREENGUARD Certified: Provide GREENGUARD Certified material. Profiles shall meet the requirements of GREENGUARD Certification Standards for Low-Emitting Products.

6. Chemical and Stain Resistance: Provide corner guards that show resistance to stain when tested in accordance with applicable provisions of ASTM D-543.

7. Fungal and Bacterial Resistance: Provide rigid vinyl that does not support fungal or bacterial growth as tested in accordance with ASTM G-21 and ASTM G-22.

8. Color Consistency: Provide components matched in accordance with SAE J-1545 - (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.

1.05 SUBMITTALS

A. Product Data: Manufacturer’s printed product data for each type of corner guard specified.

B. Samples: Verification samples of corner guard, 8" (203mm) long, in full size profiles of each type and color indicated.

C. Manufacturer’s Installation Instruction: Printed installation instructions for each corner guard.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in unopened factory packaging to the jobsite

B. Inspect materials at delivery to assure that specified products have been received.

C. Store in original packaging in a climate controlled location away from direct sunlight.

1.07 PROJECT CONDITIONS

A. Environmental Requirements: Products must be installed in an interior climate controlled environment.

1.08 WARRANTY

A. Standard Manufacturer's Limited Lifetime Warranty against material and manufacturing defects.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturer:

1. IPC Door and Wall Protection Systems,

   InPro Corporation, PO Box 406 Muskego, WI 53150 USA;

   Telephone: 800-222-5556, Fax: 888-715-8407,

   Internet address: http://www.inprocorp.com

B. Substitutions: Not permitted

C. Provide all corner guards and wall protection from a single source.

2.02 MANUFACTURED UNITS

A. Corner Guard System

1. 150BN BluNose High Impact Corner Guard Profile
2. 3" (76mm) x 3" (76mm), 90 degree
3. 9' (2.74m) standard height (cut in half for 4.5' H corner guard)
4. Custom Angles – Provide vinyl covers and retainers with custom angles. Custom angles shall be between 112.5° and 157.5°. Provide flexible top caps to bend to retainer angle.

2.03 MATERIALS

A. Vinyl Covers: Snap on cover of .080" (2mm) thickness shall be extruded from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added (plasticizers may aid in bacterial growth).

B. Vinyl Retainers: Continuous vinyl retainers of .070" (1.8mm) thickness with a co-extruded Biopolymer Flex PVC apex shall be fabricated from polyvinyl chloride with the addition of impact modifiers.

2.04 COMPONENTS

A. Top caps and bottom caps shall be made of injection molded thermoplastics.

B. Fasteners: All mounting system accessories appropriate for substrates indicated on the drawings shall be provided.

C. Optional flexible top caps shall be made of injection molded Biopolymer Flex PVC.

2.05 FINISHES

A. Vinyl Covers: Colors of the corner guard to be selected by the architect from the manufacturer’s finish selection. Surface shall have a pebblette texture.

B. Molded Components: Top caps and bottom caps shall be of a color matching the corner guards. Surface shall have a pebblette texture.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions in which the corner guard systems will be installed.

   1. Complete all finishing operations, including painting, before beginning installation of corner guard system materials.

B. Wall surface shall be dry and free from dirt, grease and loose paint.

3.02 PREPARATION

A. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

3.03 INSTALLATION

A. General: Locate corner guard as indicated on the approved detail drawings for the appropriate substrate and in compliance with the manufacturer's installation instructions. Install corner guard level and plumb at the height indicated on drawings.

B. Installation of 150BN BluNose High Impact Surface Mount Corner Guard:

1. Retainer Installation

a. Position the vinyl retainer against the wall, allowing 5/16" (8mm) from the bottom of the retainer to the top of the cove base or baseboard for the bottom cap.

b. Drywall: Secure the retainer to the wall using #8 x 1-1/4" Phillips round head, self-tapping screws. Stagger the fasteners on each wing of the retainer. Use 6 screws per 4' (1.22m) length, 10 screws per 8' (2.44m) length, or 12 screws per 9' (2.74m) length.

c. Concrete: Drill 1/4" (6.5mm) holes into the ends of the retainer for the top and bottom caps. Stagger the holes on each wing of the retainer. Use the slotted tabs on the top and bottom cap to transfer hole location to the retainer. Drill 1/4" (6.5mm) holes on the two wings of the retainer. Stagger the fasteners on each wing of the retainer. Drill 6 holes per 4' (1.22m) length, 10 holes per 8' (2.44m) length, or 12 holes per 9' (2.74m) length. Transfer the location of all mounting holes to the wall. Drill 1/4" (6.5mm) holes and position ALLIGATOR anchors into the holes on the wall. Mount the retainer with #10 x 1-3/4" phillips pan head screws and tighten to secure the retainer to the wall.

2. Top and Bottom Cap Installation:

a. Drywall: Overlap the retainer with the mounting tabs of the top and bottom caps and attach them to the retainer using two, #8 x 1-1/4" phillips flat head, self tapping screws per cap. Stagger the fasteners on each wing of the cap.

b. Concrete: Overlap the retainer with the mounting tabs of the top and bottom caps and attach them to the retainer and into the ALLIGATOR anchors using two, #8 x 1-1/2" phillips flat head screws per cap. When

installing flexible top caps on custom angle corner guards, use cup washers and flat head screws to fasten the top caps to the retainer.

3. Position the vinyl cover on the retainer to check the fit. Adjust the top cap on the retainer to obtain a tight fit with the vinyl cover. Starting at the top, push the vinyl cover over the retainer pressing over the entire length until the cover snaps securely into place.

4. INSTALLATION NOTE: Vinyl retainers can be field bent to angles 10° wider or 10° tighter than 90°. When doing so use flexible top and bottom caps or the installation should be full height from floor to ceiling.

3.04 CLEANING

A. At completion of the installation, clean surfaces in accordance with the manufacturer's clean-up and maintenance instructions.

END OF SECTION

SECTION 10400 – SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all labor, materials and equipment necessary to construct and install Room Signs as specified hereinafter.

B. Related Sections:

1. Section 09110 – No-Load Bearing Wall Framing
2. Section 09265 – Gypsum Wall Assemblies.
3. Section 09720 – Wall Covering.

1.02 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Manufacturer's Data: Submit manufacturer's descriptive literature and specifications, including color samples of material for selection, as applicable, to the WHFD AND/OR PROJECT MANAGER for approval.

C. Shop Drawings: Submit shop drawings, indicating types of materials, details, dimensions, thickness, method of fabrication, signage location with corresponding text for each sign and installation, to the WHFD AND/OR PROJECT MANAGER for approval.

D. Samples: Submit (1) full size sample of each sign type. Include sign face, backing and fasteners.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Signs shall be fiberglass or melamine plastic signs to match existing building signage.

1. Fiberglass Signs: non-corrosive, 3-ply laminate, approximately 3/16" to 1/4" thick with contrasting core color.
2. Plastic Signs: Melamine plastic laminate, 1/8" thick, with contrasting core

color, non-static, fire-retardant and self-extinguishing. Plastic laminate shall have a contrasting core color and shall be impervious to acids, alkalies, alcohol, solvents, abrasives and boiling water.

3. Color: KCH Teal.

4. Font: Avante Garde MD.

B. Letters, symbols, and borders shall be raised. Individual cutout letters and symbols applied to the sign plaque shall not be used.

C. Interior signs shall be mounted with vandal-proof screw fasteners. No double-stick tape or adhesives shall be allowed. Exterior signs shall be mounted with vandal-proof screw fasteners & expansion shields.

D. Acceptable Manufacturer's:

1. John Allen Sign Company

a. 61-3788 Maluokalani Place #2A, Kamuela, HI 96743; (808) 882-8244; jasc@bigisland.com; https://johnallensigncompany.com

2. No Substitutions.

2.02 REQUIREMENTS

A. Message configurations and dimensions for signs shall match existing building sign design as indicated. Contractor to verify existing.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Room Signs shall be installed at locations as indicated on the drawings. Install signs plumb, level and at heights indicated and in accordance with ADA Architectural Guidelines.

3.02 CLEAN-UP

A. Remove all debris and unused materials from jobsite. Repair any damage caused by sign mounting and removal. Protect signs from damage until acceptance by the WHFD AND/OR PROJECT MANAGER.

END OF SECTION

SECTION 10520 – PORTABLE FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The work includes providing portable fire extinguishers to afford 100% complete fire protection coverage throughout the indicated areas. The design, equipment, materials, installation, and workmanship shall be in strict accordance with the required and advisory provisions of NFPA 10, except as modified herein.

B. The fire extinguisher installation shall include all materials, accessories, and equipment necessary to provide a system complete and ready for use. Design and installation of the system shall be with full consideration physical obstructions, furniture, and equipment. Portable fire extinguishers shall be listed by the Underwriters' Laboratories, Inc. (UL) or approved by FM Approvals (FM). In the National Fire Protection Association (NFPA) publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word “shall” had been substituted for “should” wherever it appears; reference to the “authority having jurisdiction” shall be interpreted to mean the Building Department and Fire Department. Reference to the “Building Department” on the contract drawings and herein shall be interpreted to mean the County of Hawaii Public Works Building Division; reference to the “Fire Department” shall be interpreted to mean the Hawaii County Fire Department. “Provide” shall mean “furnish and install” when used herein. The work shall begin at the points indicated.

1.02 CODES, STANDARDS, AND REGULATIONS

A. The latest publications listed below form a part of this specification. The publications are referred to in the text by the basic designation only.

B. Installation of all work in this section shall be made in accordance with State Department of Health Regulations, the National Fire Protection Association, the International Building Code, and the Uniform Fire Code.

C. All applicable codes, regulations and ordinances of public bodies having jurisdiction are considered a part of these specifications. All work installed and

materials provided must comply with the current edition of such codes, regulations, and ordinances.

D. Factory Mutual (FM) Global, FM Approval Guide, Updated online.

E. National Fire Protection Association (NFPA) 10, Portable Fire Extinguishers, 2010.

F. Underwriters Laboratories (UL), Inc, UL Fire Protection Equipment Directory (UL FPED), Updated online.

1.03 CONTRACT DRAWINGS

A. Contract drawings are essentially diagrammatic, indicating general layout and approximate locations toward establishing the scope for a uniform estimating basis for all bidders. They are not intended to be detailed construction working drawings. Reasonable modifications to indicated locations and arrangement to suit job conditions shall not constitute basis for requesting additional funds from the Owner.

B. Verification of Dimensions: The Contractor shall be responsible for the coordination and proper relation of his or her work to the structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself or herself with all details of the work and notify the Architect of any discrepancy before performing any work.

1.04 RELATED SECTIONS

A. Section 09110 – Non-Load Bearing Wall Framing.

B. Section 09265 – Gypsum Board Assemblies.

1.05 SUBMITTALS

A. General: Partial submittals will not be acceptable. The Architect will review and approve all submittals. Contractor shall check the submittals and shop drawings and certify that they are correct and in compliance with the contract drawings and specifications. Submit 6 copies for approval.

B. Manufacturer's Published Data:

1. As soon as practicable and before installation of any materials or equipment is begun, the Contractor shall submit a complete list of materials and

equipment together with names and addresses of manufacturers, catalog numbers, and trade names to the Architect for approval.

2. Annotate descriptive data to show the specific model, type, and size of each item the Contractor proposes to provide.

    a. Fire extinguishers

    b. Fire extinguisher cabinets

3. Approval of materials will be based on manufacturer's published rating. Any materials and equipment that are not in accordance with these specifications may be rejected.

4. UL FPED or FM AG sheets showing the manufacturer and specific model of fire extinguisher the Contractor proposes to provide.

1.06 OMISSIONS

A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions, the Contractor shall call the attention of the Architect to such omissions 15 days in advance of the date of bid opening so that the necessary corrections can be made.

1.07 DELIVERY, STORAGE AND HANDLING

A. Furnish new equipment, materials and accessories bearing the manufacturer's identification. Coordinate deliveries to avoid interference or construction delays. Protect products during delivery, storage, installation and the remainder of the contract period after installation.

1.08 GUARANTEE AND CERTIFICATE

A. Contractor and Installer shall guarantee and certify in writing all work in this section for a period of one year. Contractor shall be responsible for all damages to any part of premises during equipment installation work under this section.

B. The entire fire extinguisher installation described hereinafter shall be guaranteed as a complete working unit for a period of one year. In the event of failure due to faulty workmanship or materials during this period, all said failures shall be corrected to the satisfaction of the Architect at no additional cost to the Owner for labor and material.

C. The above guarantee shall not be interpreted as voiding, limiting, or reducing any equipment manufacturer's warranty or any guarantee permitted by law.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Asbestos-containing materials or equipment shall not be used under this section. The Contractor shall insure that all materials and equipment incorporated in the project are asbestos-free.

B. All materials shall be new, of equal or better quality of materials specified. For ease of maintenance and parts replacement, select equipment from a single manufacturer as much as possible.

2.02 EQUIPMENT

A. Portable fire extinguishers: Provide UL rated 2A:10B:C, nominal 5 lb, multipurpose dry chemical fire extinguisher with red powder coated steel cylinder. Provide Potter Roemer 3005 or approved equal. Provide with completed inspection tags.

B. Semi-recessed fire extinguisher cabinet: Provide-semi-recessed steel cabinet with clear tempered safety glass panel. Cabinet trim shall not project more than 3 inches from the face of the wall. Provide Potter Roemer 7008-A or approved equal where installed in non-fire rated walls and Potter Roemer FRC-7008-A or approved equal where installed in fire-rated walls.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install fire extinguisher cabinet such that the fire extinguisher handle does not exceed 48 inches above finished floor. Bottom of cabinet shall not be less than 18 inches above finished floor.

B. Install portable fire extinguisher with operating instructions facing outward.

C. Install portable fire extinguisher with pressure gauge facing outward.

END OF SECTION

SECTION 10810 – TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Stainless steel grab bars.
2. Robe hooks.

B. Related Sections include the following:

1. Section 08200 – Wood Doors.
2. Section 08830 – Mirrors.
3. Section 09110 – Non-Load Bearing Wall Framing.
4. Section 09260 – Gypsum Board Assemblies.
5. Section 09720 – Wall Covering.

1.02 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Product Data: Submit manufacturer's catalog cut sheets and data sheets.

C. Informational Submittals: Submit the following packaged separately from other submittals:

1. Certifications specified in Quality Assurance article.
2. Manufacturer's Instructions.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to the American's with Disabilities Act and/or federal or local codes if more stringent requirements are applicable for installing work for accessibility to handicapped.

B. Certification: Provide verification of grab bar strength and installation.

1.04 DELIVERY STORAGE AND HANDLING

A. Pack accessories individually with protective wrappings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The products of the following manufacturers are acceptable provided they meet or exceed the materials and construction requirements specified and are prequalified:

1. Bobrick Washroom Equipment, Inc., Clifton Park, NY.

2. Or approved equal.

B. Substitutions: Only under provisions set forth in applicable specifications sections. Other manufacturers may be submitted for evaluation by the WHFD AND/OR PROJECT MANAGER by following the conditions of the substitutions clause. The WHFD AND/OR PROJECT MANAGER shall be the sole judge as to the acceptability of all products submitted for substitution.

2.02 MATERIALS

A. Stainless Steel:

1. Sheet: ASTM A240, UNS S30400, 22 gage, except where specified otherwise.

2. Tubing: ASTM A269, UNS S30400.

B. Sheet Steel:

1. Cold Rolled: Commercial quality ASTM A336, 20 gage minimum. Surface preparation and metal pretreatment as required for applied finish.

2. Galvanized Steel: ASTM A526, A527 or A528, G60 zinc coating.

C. Aluminum Casting: ASTM B85.

D. Fasteners: Screws, bolts, and other devices of same material and finish as accessory item, or of galvanized steel, ASTM A123 where concealed; theft-proof design at exposed conditions.

E. Expansion Shields: Type as recommended by accessory manufacturer for component and substrate.

2.03 FABRICATION

A. Weld and grind smooth joints of fabricated components.

1. Form exposed surfaces from single sheet of stock, free of joints.

2. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

3. Back paint components where contact is made with building finishes to prevent electrolysis.

4. Shop assemble components and package complete with fasteners, anchors, and fittings.

2.04 FACTORY FINISHING

A. Galvanizing after fabrication: ASTM A123.

B. Shop primed ferrous metals: Pre-treat and clean, spray apply one coat primer and bake.

C. Stainless Steel: Satin Finish.

2.05 SCHEDULE OF TOILET ACCESSORIES

A. Soap Dispenser (OFOI).

B. Surface-Mounted Paper Towel Dispenser (OFOI).

C. Surface-Mounted Toilet Paper Dispenser (OFOI).

D. Surface-Mounted Toilet Seat Cover Dispenser (OFOI).

E. Grab Bars:

1. Grab bar to be fabricated of 18-8, type 304 18 gauge stainless steel tubing with satin finish.

2. Performance Requirements, Grab Bars: Install to support 500 pound hanging load places at any point along bar length.

a. Comply with ADA requirements.

b. Mount horizontally unless otherwise shown.

3. At CMU Partitions: Fasten with expansion anchors to grouted CMU cells.

4. See drawings for configuration and mounting information.

F. Robe Hook:

1. Description: Double prong unit, surface mounted

2. Material Finish: Satin Stainless Steel.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions and proceed with Work in accordance with other applicable Sections.

1. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings and instructed by manufacturer.

2. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Deliver accessories and wall reinforcement to site at appropriate time for installation.

1. Provide templates and rough-in measurements as required.

2. Verify exact location of accessories for installation.

3. Protect adjacent or adjoining finished surfaces and work from damage during installation.

4. Coordinate work with placement of wall reinforcement to receive anchor attachments.

5. Supply rough-in data in sufficient time to be built into other work.

6. Do not install accessories until room finishes are completed.

3.03 INSTALLATION

A. Accessories: Install in accordance with other applicable Sections.

1. Install plumb, level and securely anchored to substrate.

2. Locate accessories in order that they do not interfere with door swings or use of fixtures. Install accessories after wall finishes have been completed.

3. Anchor accessories with bolts, plates, and approved type fasteners.

4. Install surface mounted accessories to back up material with toggle bolts, plumb and align.

B. Adjusting and Cleaning:

1. Adjust accessories for proper operation.

2. Clean and polish exposed surfaces after removal of protective coverings.

END OF SECTION

DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 13281 - REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING MATERIALS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Furnish all labor, materials, and equipment necessary to carry out the safe removal and disposal of all asbestos containing materials (ACM) and suspected ACM as necessary for the safe performance of the renovation project in compliance with the Specifications and all applicable Federal, State and Local laws and regulations. If there is a conflict with the requirements, the more stringent requirement shall apply. Ignorance of the above requirements and any applicable regulations resulting in additional cost to the Contractor shall not be reimbursable or billable to the Engineer. Any question regarding conflict or inconsistency between Specification and/or regulations should be directed to the Engineer's authorized representative.

B. The asbestos abatement work shall include, but may not be limited to:

1. Removal and disposal of ACM from the areas affected by the Project. ACM is identified the Limited Hazardous Materials Survey Report, Kona Community Hospital in Kealakekua, Hawaii, dated December 16, 2019 was prepared by EnviroServices & Training Center, LLC.

2. The Contractor is responsible for conducting his own site visit to verify all quantities and material locations.

3. The Contractor is responsible for conducting all work without disturbing ACM to remain in place.

1.02 RELATED SECTIONS

A. Section 01715 – Existing Conditions – Hazardous Materials Survey.

1.03 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only, and include but are not limited to, the following:

1. CODE OF FEDERAL REGULATIONS (CFR)

   a. 29 CFR 1926.103 Respiratory Protection

   b. 29 CFR 1926.51 Sanitation

   c. 29 CFR 1926.200 Accident Prevention Signs and Tags

   d. 29 CFR 1926.59 Hazard Communication

   e. 29 CFR 1926.1101Asbestos, Tremolite, Anthophyllite, Actinolite

   f. 40 CFR 61-SUBPART A General Provisions

   g. 40 CFR 61-SUBPART M National Emission Standard for Asbestos

   h. 49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations

   i. 49 CFR 178 Shipping Container Specification

2. ENVIRONMENTAL PROTECTION AGENCY (EPA)

   a. EPA 560/5-85-024 Guidance for Controlling ACM in Buildings

3. HAWAII OCCUPATIONAL SAFETY AND HEALTH (HIOSH)

   a. 12-114.2 Personal Protective Equipment

   b. 12-121.2 Fall Protection

   c. 12-122.2 Materials Handling, Storage, Use, and Disposal

   d. 12-145.1 Asbestos

   e. 12-151 Hazardous Waste Operations and Emergency Response

4. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

   a. ANSI Z9.2 (1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems

   b. ANSI Z88.2 (1992) Respiratory Protection

5. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

    a. ASTM E 1368 (1990) Visual Inspection of Asbestos Abatement Projects

    b. ASTM E 1494 (1992) Encapsulants for Spray- or Trowel-Applied Friable Asbestos-Containing Building Materials

6. UNDERWRITERS LABORATORIES INC. (UL)

    a. UL 586 (1990) High-Efficiency, Particulate, Air Filter Units

1.04 DEFINITIONS

A. Abatement: Procedure to control fiber release from asbestos containing material.

1. Removal: Shall adhere to all specified procedures herein and shall include the proper removal and disposal of asbestos containing material as per all applicable Federal, State and local rules, regulations, and industry standards.

2. Post-Removal Surface Encapsulation: Procedures necessary to coat surfaces from which ACM have been removed to control any residual fiber release.

B. Amended Water: Water containing a wetting agent or surfactant with a maximum surface tension of 2.9 Pa (29 dynes per square centimeter) when tested in accordance with ASTM D 1331.

C. Asbestos: The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered.

D. Asbestos-Containing Material (ACM): Materials that contain more than one percent asbestos as determined by Polarized Light Microscopy or Transmission Electron Microscopy.

E. Asbestos Control Area: That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

F. Asbestos Fibers: Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by NIOSH Method 7400.

G. Asbestos Permissible Exposure Limit (PEL): 0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

H. Background: The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

I. Certified Clean: Certification that a work area has no visible signs of fibrous materials or other contamination and does not have levels of airborne fibers above the defined air clearance criteria.

J. Competent Person: As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of asbestos hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the asbestos hazards.

K. Contractor: The Contractor is that individual, or entity engaged under contract to the Engineer or General Contractor to remove, encapsulate and/or dispose of ACM.

L. Decontamination Facility (DF) or Area: A series of connected rooms or spaces including Clean, Shower, and Contaminated Equipment Areas, used for both the decontamination of all workers, equipment and their personal protective equipment upon departing an asbestos removal work area, and for access to such work areas.

M. Engineer's Authorized Representative: The person or persons designated by the Engineer to act on his/her behalf, who performs inspection activities during abatement and renovation work and shall have the authority to initiate engineering controls.

N. Fixed Object: A unit of equipment or furniture in the work area which cannot be removed from the work area without dismantling.

O. Friable Asbestos Material: ACM that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

P. High Efficiency Particulate Air (HEPA) Filter Equipment: HEPA filtered vacuum and/or exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

Q. Non-Friable ACM: ACM in which the asbestos fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that Non-Friable ACM may release asbestos fibers under other conditions such as demolition, removal, or mishap.

R. Post-Removal Encapsulant: A liquid material applied to surfaces from which ACM has been removed, to control the possible release of residual fibers, either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components (penetrating encapsulant).

S. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

T. Wetting Agent: A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied.

1.05 ABBREVIATIONS

A. ANSI: American National Standards Institute, Inc.

B. CFR: Code of Federal Regulations

C. HIOSH: Division of Occupational Safety and Health, Department of Labor and Industrial Relations, State of Hawaii

D. EPA: U.S. Environmental Protection Agency

E. NESHAP: National Emission Standards for Hazardous Air Pollutants

F. NIOSH: National Institute for Occupational Safety and Health

G. OSHA: Occupational Safety and Health Administration

H. State: State of Hawaii

1.06 AUTHORITY TO STOP WORK

A. The Engineer's authorized representative has the authority to stop the abatement work at any time they determine that conditions are not within the drawing/specification requirements and applicable regulations. The work stoppage shall continue until corrective steps have been taken and specified conditions restored to the satisfaction of the Engineer's authorized representative. Standby time required to resolve violations shall be at the Contractor's expense. Stop Work Orders may be issued for, but shall not be limited to the following:

1. Excessive airborne fibers inside (>0.5 f/cc) and/or outside (>0.01 f/cc) the work area.
2. Visible emissions of dust or debris going beyond the work area boundaries.

1.07 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Detailed Schedule: Submit the actual start date and completion dates for each phase of the asbestos removal.

C. Notices: As regulated by each agency and before commencement of any on-site project activity send written notice of the proposed asbestos abatement work as early as possible but at least 10 working days prior to commencement of work in accordance with Hawaii Administrative Rules, Title 11, 501.Send notice with copies to the Engineer's authorized representative and to the following agencies:

1. State of Hawaii, Department of Health, "Notification of Demolition and Renovation" form. Send to: Noise, Radiation and Indoor Air Quality Branch, Asbestos Abatement Office, State of Hawaii, 99-945 Halawa Valley Street, Aiea, Hawaii 96701.

D. Permits and Licenses: Submit copies of all permits, licenses and arrangement for removal, transportation and disposal of ACM no later than 20 consecutive working days from notice of award unless otherwise instructed in writing by the Engineer's authorized representative.

E. Landfill Approval: Submit written evidence that the landfill for disposal is approved for asbestos disposal by the EPA and Hawaii regulatory agency(s).

F. Manufacturer's Data: Submit copies of manufacturer's specifications, installation instructions and field test materials for all equipment related to asbestos handling and abatement, including any other data that may be required to demonstrate compliance with these Specifications and proposed uses.

G. Samples: Submit samples of the following items for approval prior to ordering materials:

1. Asbestos encapsulant(s): Copies of manufacturer's literature including all laboratory data, SDS, and application instructions.
2. Plastic sheeting: Three 8-1/2 by 11-inch pieces of each thickness and type with labels indicating actual mil thickness.
3. Surfactant: Copies of manufacturer's literature including all laboratory data, SDS, and mixing and application instructions.
4. Tapes and adhesives: Copies of manufacturer's literature including all laboratory data.
5. Warning labels and signs.
6. Protective clothing: Copies of manufacturer's literature on all protective clothing and one sample of each item. Samples submitted will be returned to the Contractor.
7. Respiratory equipment: Copies of manufacturer's literature on all respiratory equipment and one sample of each item along with a description of where and how each item will be used. Samples submitted will be returned to the Contractor.

H. Shop Drawings: Submit no later than 10 consecutive working days from award notice, copies of shop drawings for the following items as a minimum:

1. Description of any equipment to be employed not discussed in this Section.
2. Security provisions, if any, in and around the project area.
3. Outline of work procedures to be employed.
4. Location and construction of all airtight barriers.
5. Staging of the work.

6. Entrances and exits to the workplace.

7. Location and construction of worker and equipment decontamination units.

8. Type of respiratory protection to be used.

9. Water filtration system for all contaminated water.

10. Existence and location of negative air exhaust ports and containment.

I. Asbestos Abatement Plan: Contractor shall develop, submit for approval to the Engineer's authorized representative no later than 15 consecutive days from notice of award, and implement a work procedure for abatement work describing work practices and engineering controls to be used to prevent emissions of asbestos from the work site, ensure maximum site safety and safeguard the public, workers and the environment from asbestos exposure. The Asbestos Abatement Plan will be a detailed plan of the safety precautions such as lockout-tagout, fall protection, and equipment, and work procedures to be used in the removal of ACM. The plan shall be prepared, signed, and sealed by a State of Hawaii Certified Project Designer. Such plan shall include but not be limited to the precise personal protective equipment protection, the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, and a detailed description of the method to be employed in order to control environmental pollution. This plan must be approved in writing prior to starting any asbestos work. The Contractor and the Engineer's authorized representative shall meet prior to the start of work to discuss in detail the standard operating procedures. Once approved by the Engineer's authorized representative, the plan will be enforced as if an addition to the Specification.

J. Documentation of Training: Submit no later than 10 consecutive working days from notice of award, documentation that each and every individual, including foreman, supervisors, other company personnel or agents, and any other individual who may be exposed to airborne asbestos fibers and who may be responsible for any aspects of abatement activities which may occur, has currently attended and passed the AHERA Abatement Worker and/or AHERA

Abatement Contractor/Supervisor course, whichever is relevant to that workers responsibilities, as specified in Hawaii Administrative Rules, Title 11, 504 and 40 CFR Part 763, “Asbestos Materials in Schools”. These courses shall be approved by the State of Hawaii Department of Health in the most current listing of the Federal Register. Also submit documentation that all individuals have current certification for the appropriate course from the State of Hawaii. No worker shall be allowed on site if they are found to have either an expired certification or do not comply with the requirements set forth in Hawaii Administrative Rules, Title 11, 501-504 and 40 CFR Part 763 on training. The Contractor shall be responsible for keeping the documentation up to date and submitting subsequent documentation to the Engineer’s authorized representative before any additional employee or individual, not currently on the list, is allowed within the project site.

K. Documentation of Instructions: Submit no later than 10 consecutive working days from notice of award, documentation that all personnel or agents who may be exposed to airborne asbestos fibers and who may be responsible for any aspects of abatement activities which may occur have had instructions on the nature of the activities and operations which create a risk of asbestos exposure and the necessary protective steps, on use and fitting of respirators in accordance with qualitative procedures as detailed in HIOSH 12-145.1 Appendix C, Qualitative and Quantitative Fit Testing.

L. Documentation From Physician: Submit no later than 10 consecutive working days from notice of award, documentation from a licensed medical doctor that all employees or agents who may be required to wear a respirator have been provided with an opportunity to be medically monitored to determine whether they are physically capable of working while wearing the required respirator without suffering adverse health effects. In addition, document that all individuals permitted within the project site have received medical monitoring or had such monitoring made available to them as required in HIOSH 12-145.1. The Contractor must be aware of and provide information to the examining physician about unusual conditions in the workplace environment (e.g. high temperatures, humidity, chemical contaminants) that may impact the employee’s ability to perform work activities. The Contractor shall keep and make available to all affected individuals a record and the results of such examinations.

M. Medical Surveillance Program: Submit no later than 10 consecutive days from notice of award, all medical examinations for employees to be used on this project and a copy of the Contractor's medical surveillance program prepared in accordance with all applicable Federal, State and local laws.

N. Respiratory Protection Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Respiratory Protection Program prepared in accordance with all applicable laws. The Contractor shall also submit fit test records on all employees to be used on this project who may be required to wear a respirator.

O. Hazard Communication Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Hazard Communication Program prepared in accordance with all applicable laws.

P. Safety Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Health and Safety Plan prepared in accordance with all applicable laws.

Q. HEPA Vacuums: Submit no later than 10 consecutive working days from notice of award, manufacturer's certification that vacuums conform to ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems as applicable to this project.

R. Rental Equipment: When rental equipment is to be used in abatement areas or to transport asbestos contaminated waste, a written notification concerning intended use of the rental equipment must be provided to the rental agency with a copy submitted to the Engineer's authorized representative.

S. Testing Laboratory: Submit no later than 10 consecutive working days from notice of award name, address and telephone number of testing laboratory responsible for analysis and report of airborne fiber concentration for compliance with HIOSH 12-145.1 and this specification, along with evidence that the air monitoring testing laboratory is a successful participant in the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) program for phase contrast microscopy (PCM).

T. Emergency Planning and Procedures: The Contractor shall submit an emergency plan prior to abatement initiation for review and acceptance by the Engineer's authorized representative.

1. Emergency procedures shall be in written form and prominently posted adjacent to the Health and Safety Plan. Prior to entering the work area, everyone must read and sign these procedures to acknowledge receipt of emergency exits and emergency procedures.

2. Emergency planning shall include notification of police, fire, and emergency medical personnel of the work schedule of the planned abatement activities, and of the layout of the work area, particularly any barriers that may affect response capabilities.

3. Emergency planning shall include considerations of fire, explosion, toxic atmosphere, electrical hazards, slips, trips and falls, confined spaces, and heat related injury. Written procedures shall be developed, and employee training procedures shall be provided in the Contractor's plan.

U. Visitor/Worker Entry Log: Maintain a log of all personnel including the Contractor's employees and agents who enter the work area while asbestos abatement operations are in progress, until final clearance is passed. The log shall contain the following information as a minimum and certified copies shall be submitted to the Engineer's authorized representative weekly:

1. Date of visit.

2. Visitor's name, employer, business address, and telephone number.

3. Time of entry and exit from work area.

4. Purpose of visit.

5. Type of protective clothing and respirator worn.

6. Certificate of release signed and filed with the Contractor.

V. Field Test Reports

1. Employee Exposure Sampling Results: Submit test results to the Engineer's authorized representative and the affected Contractor's employees within three (3) working days, signed by the testing laboratory employee performing

the analysis.

2. Asbestos Disposal Quantity Report.

W. Waste Disposal Manifest Forms: Submit copies of all transport manifests, trip tickets and disposal receipts for all asbestos containing waste materials no later than 10 consecutive working days from the date the waste is removed from the work area during the abatement process.

1.08 PRODUCT HANDLING

A. Deliver materials to the site in original packaging, containers or bags fully identified with manufacturer's name, brand and lot number. Store materials in a dry, well-ventilated space under cover, off the ground and away from surfaces subject to dampness or condensation as approved by the Engineer's authorized representative. Material that becomes contaminated with asbestos shall be disposed of in accordance with applicable regulations. Replacement materials shall be stored outside the contaminated work area until abatement is completed.

1.09 PROTECTION

A. Site Security:

1. The work area is to be restricted only to authorized, trained, and protected personnel. These may include the Contractor's employees, the Engineer's authorized representative, State and local inspectors and any other designated individuals. A list of authorized personnel shall be established prior to job start.

2. Entry to the work area by unauthorized individuals shall not be permitted without the express approval of the Engineer's authorized representative and any such entry shall be reported immediately to the Engineer's authorized representative by the Contractor.

3. A Visitor/Worker Entry Log shall be maintained.

4. The Contractor shall have control, subject to approval of the Engineer's authorized representative, of security in the work area and in proximity of Contractor's equipment and materials.

B. Site Protection and Safety: As a minimum, follow the requirements of all applicable Federal, State and local regulations. Take all necessary precaution to ensure there is no asbestos contamination to those areas not included in the work schedule.

C. Protective Covering: The Contractor shall provide and install protective covering as required or upon request by the Engineer's authorized representative. Protective covering shall be unused plastic sheets.

D. Safeguarding of Property: The Contractor shall take whatever steps necessary to safeguard his work area, any property of the Engineer, and all other individuals in the vicinity of his work area during the execution of this Contract. The Contractor shall be responsible for and shall compensate to the injured party's satisfaction any and all damages resulting from their employee's negligence.

1.010 ADDITIONAL REQUIREMENTS

A. The Contractor shall always examine and have, at all times, in his possession at his office (one copy) and in view at each job site office (one copy) the following materials:

1. Hawaii Administrative Rules, Title 11, Chapters 501, 502, 503 and 504;
2. Title 29 Code of Federal Regulations Part 1926.62; Safety and Health Standards;
3. Title 29 Code of Federal Regulations Part 1926.1101; Asbestos;
4. Title 29 Code of Federal Regulations Part 1910.134; Respiratory Protection;
5. Title 40 Code of Federal Regulations Part 261; Identification and Listing of Hazardous Waste;
6. Title 40 Code of Federal Regulations Part 262; Standards Applicable to Generators of Hazardous Waste;
7. Title 40 Code of Federal Regulations Part 263; Hazardous Waste Transporters;
8. Copies of any other applicable Federal, State and local regulations, standards, documents and codes;
9. Documentation of the adequacy of compressed air systems and respiratory

protection system including a list of compatible components and specifications of the types and maximum number of respirators that may be used with the system;

10. Copies of the procedures for the use of the decontamination enclosure system or any other procedures which have been established to prevent contamination or areas outside the work area;
11. Copies of procedures to be followed during medical emergencies, including phone numbers of the nearest hospital or other emergency facility, which shall be posted by the nearest telephone;
12. Copies of the Contractor's Respiratory Protection Program, Hazardous Communication Program, Safety Program and Asbestos Abatement Plan;
13. Copies of Material Safety Data Sheets for all chemicals used;
14. Copies of all relevant certificates held by abatement workers and abatement contractors/supervisors actively engaged in the abatement project;
15. Certification of the Project Designer who wrote procedures for the job;
16. Copies of bulk sampling results, including inspector and laboratory names, of all suspect material to be disturbed that is not assumed to be asbestos-containing; and
17. Records of all air sampling as required in HIOSH section 12-145.1-5.

B. Whenever approval of the Engineer's authorized representative is required prior to proceeding with other work, the Contractor shall comply with the following:

1. The Contractor shall give, at a minimum, five (5) days notification to the Engineer's authorized representative prior to the start of any asbestos work.
2. The Contractor shall not begin any work without the Engineer's authorized representative present onsite.
3. The Contractor shall allow the Engineer's authorized representative 24 hours from notification to respond to the request for site inspection(s).
4. The Contractor shall designate one person (either a foreman or superintendent) who will be authorized to request inspections. The name of the designated person shall be submitted in writing to the Engineer's

authorized representative prior to commencing work. Requests from any other person will not be considered official requests.

5. The designated person requesting an inspection shall provide the following information:

   a. Name of caller.

   b. Building and rooms to be inspected.

   c. Work phase of inspection, as specified.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plastic Sheeting: 6-millimeter-minimum-thickness polyethylene film.

B. 6-mil Plastic Bags: Transparent, 6-millimeter minimum thickness, seamless bottomed polyethylene bags. All bags used to transport ACM must carry the DOT class 9 label, a space for generator information and the following warning:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

C. Tape: Tape shall be capable of sealing joints of adjacent sheets of polyethylene, attaching polyethylene sheeting to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions such as when amended water is used.

D. Adhesives: Adhesive shall be capable of sealing joints of adjacent sheets of polyethylene, attaching polyethylene sheeting to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions such as when amended water is used.

E. Encapsulant: The encapsulant shall be capable of being applied to surfaces of ACM and surfaces from which ACM has been removed to control the possible release of asbestos fibers. The encapsulant shall be capable of either creating a membrane over the surface (i.e. a bridging encapsulant) or penetrating the

material and binding its components (i.e. a penetrating encapsulant) and shall be compatible with the existing finishes.

F. Post-Removal Encapsulation: The encapsulant shall be capable of being applied to surfaces from which asbestos-containing material has been removed to control the possible release of residual fibers. The encapsulant shall be capable of either creating a membrane over the surface (i.e. a bridging encapsulant) or by penetrating into the material and binding its components (i.e. a penetrating encapsulant) and shall be compatible with the existing finishes.

G. Surfactant (Wetting Agent): 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether, or pre-approved equal, and shall be mixed with water to provide a minimum concentration of one ounce of surfactant to five (5) gallons of water.

H. Warning Labels, Tape and Signs: As required by OSHA 29 CFR 1926.1101 and HIOSH regulation 12-145.1.

I. Protective Clothing: The Contractor shall have all the coveralls required for this project on site prior to the start of work.

J. Other Products: Provide all other materials including but not limited to, lumber, plywood, nails, fasteners, metal studs, hardware, sealants, and caulking which may be required to properly prepare and complete this project.

2.02 TOOLS AND EQUIPMENT

A. Provide sufficient and suitable tools for the asbestos abatement procedures, including but not limited to:

1. Water Sprayer: Airless or pressure sprayer for amended water application as applicable.

2. Paint/Encapsulant Sprayer: Airless type only.

3. HEPA vacuum.

4. Negative Air Pressure Units: Portable “exhaust units with air purification equipment in accordance with “Guidance for Controlling Asbestos Containing Materials in Buildings” (the Purple Book) EPA 560/5-85-024 June 1985, Appendix J – Recommended Specifications and Operating Systems

Procedures for the Use of Negative Air Pressure Systems for Asbestos Abatement. Ensure that at least one functional back-up negative air pressure unit is on-site.

5. Ladders or Scaffolds: All ladders and scaffolds shall be OSHA approved and shall be of sufficient dimensions and quantities so that all work surfaces can be easily and safely accessed by the workers, the Engineer's authorized representative and other inspectors. Scaffold joints and ends shall be sealed with tape to prevent migration of asbestos fibers.
6. Electrical Equipment: All electrical equipment shall be Underwriter's Laboratory listed and approved, and shall have ground fault circuit interrupter protection, installed by a licensed electrician.
7. Hand Power Tools: All hand power tools shall be equipped with HEPA–filtered local exhaust ventilation if used to drill, cut or otherwise disturb ACM.
8. Other tools and equipment as necessary.

2.03 ELECTRICAL EQUIPMENT PROTECTION

A. Non-current carrying metal parts of the Contractor's fixed, portable and plug-connected equipment shall be grounded. Portable tools and appliances protected by a UL approved system of double insulation need not be grounded. All light and power circuits in the asbestos removal area shall be protected by ground fault circuit interrupters.

B. Extension cords shall be the 3-wire type, protected from damage, and shall not be fastened with staples, hung from nails, or suspended with wires. Splices shall have soldered wire connections with insulation equal to the cable. Worn or frayed cords shall not be used.

C. As necessary, safe lighting equipment for each work area shall be provided by the use of wire guard protected floodlights. Temporary wiring shall be properly insulated and substantially supported. Circuits shall be properly designed and fused. All temporary lighting inside the asbestos removal area shall be weather-proofed.

2.04 PERSONAL PROTECTION REQUIREMENTS

A. The contractor acknowledges that he alone is responsible for instruction and for enforcement of personal protection requirements and that these specifications provide only a minimum acceptable standard.

B. Personal Protective Equipment (PPE)

1. Respirators: Provide personnel engaged in pre-cleaning, cleanup, handling, removal and demolition of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101, - 29 CFR 1926.103 and 29 CFR 1910.134. Respirators shall be worn at all times within the work area and any other areas where workers may be exposed to asbestos.

2. Outer protective clothing: Provide personnel exposed to asbestos with disposal “non-breathable,” whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposal plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort but shall not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape. Reusable whole body outer protective clothing shall not be used.

3. Additional safety equipment (e.g. hardhats meeting the requirements of ANSI Z89.11981, eye protection meeting the requirements of ANSI Z41.1-1967, disposable PVC gloves), as necessary, shall be provided to all workers.

PART 3 - EXECUTION

3.01 DECONTAMINATION AREA

A. The decontamination area as outlined below shall be employed during removal work involving only exterior materials that do not extend to the interior, where all work is performed from the exterior and the work area is fully sealed off from the interior.

B. General: The Contractor shall construct the decontamination area, acceptable to the Engineer’s authorized representative, adjacent to the work area. The decontamination area shall consist of an area covered by an impermeable drop

cloth on the floor or horizontal working surface. The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

C. Access: In all cases, access between contaminated rooms or areas and clean rooms or areas shall be through the decontamination system.

D. Cleaning: Work clothing and personal protective equipment must be cleaned in the decontamination area with a HEPA vacuum prior to removal. All equipment and surfaces or containers filled with ACM must be cleaned in the decontamination area prior to removal.

E. Clean Area: The Contractor shall establish a clean area adjacent to the decontamination area with sufficient space for storage of any worker's and agent's street clothes, personal effects and other non-contaminated items.

3.02 DECONTAMINATION ENCLOSURE SYSTEM

A. The decontamination enclosure system as outlined below shall be employed during any abatement work involving indoor materials, including materials extending from the exterior to the interior such as window or vent sealant, except where openings to the interior are fully sealed and all work is performed from the exterior of the building.

B. General: The Contractor shall construct the decontamination enclosure system or use portable units acceptable to the Engineer's authorized representative that are connected to the work area with framed-in or accordion tunnels. The Contractor shall line all tunnels with 6-mil plastic and shall seal this lining with tape at all joints. All vertical surfaces subject to observation from the exterior, non-contaminated areas shall be constructed of opaque materials.

C. Access: In all cases, access between contaminated rooms or areas and the decontamination enclosure unit shall be through an airlock. In all cases, access between any two rooms/areas within the decontamination enclosure unit shall be through a curtained doorway.

D. Decontamination Unit: Provide personnel decontamination unit within the asbestos control area in an area approved by the Engineer's authorized representative. The Unit shall contain the following:

1. An Equipment Area with two doorways, one leading to the Work Area and another leading to the Shower Area

2. A Shower Area with two doorways, one leading to the Equipment Area and another leading to the Clean Area. An adequate supply of soap shall be maintained within this Shower Area. The Contractor must ensure that no leakage from the shower area occurs and that all wastewater shall be disposed of as contaminated or filtered through the wastewater filtering system.

3. A Clean Area with two doorways, one leading to the Shower Area and another leading to a non-contaminated area outside the asbestos work area. The Clean Area shall have sufficient space for storage of any worker's and agent's street clothes, personal effects and other non-contaminated items.

3.03 NEGATIVE PRESSURE SYSTEM

A. The negative pressure system outlined below shall be employed for all interior asbestos abatement work, including materials extending from the exterior to the interior such as window or vent sealant, except where openings to the interior are fully sealed and all work is performed from the exterior of the building.

B. Local Exhaust System: Provide a local exhaust system in the asbestos control area in accordance with ANSI Z9.2 and 29 CFR 1926.1101 that will provide at least six air changes per hour within the negative enclosure. Local exhaust equipment shall be operated continuously until the asbestos control area is removed and shall be leak proof. To lengthen the life of the HEPA filter, the local exhaust system shall be equipped with a 10-micron particle arrestance pre-filter, a 5-micron particle arrestance secondary filter placed ahead of the HEPA filter. Maintain a minimum pressure differential in the work area of (–)0.08 inches of water gauge relative to the air pressure outside the work area. HEPA filters shall conform to ANSI Z9.2 and UL 586.

C. Location of Exhaust Units: Locate units to ensure that the flow of air moves from the decontamination unit and passes through as much of the work area as is possible. The local exhaust system shall not terminate in an occupied space or near a ventilation intake.

D. Filter Replacement: Change filters in the local exhaust units in accordance with the manufacturer's recommendations or when there is a loss of negative pressure. With the unit in operation change the prefilter and check for pressure drop. If the pressure drop remains, with the unit in operation change the secondary filter. If the pressure drop still remains, stop work, shut off the unit and replace the HEPA filter as per the manufacturer's recommendations. All used filters are to be disposed of as asbestos waste.

3.04 WASTEWATER FILTERING SYSTEM

A. All wastewater shall be treated as contaminated with asbestos and shall be filtered using two in-line filter cartridges with 2" inlets and outlets and be removed from the site by the Contractor. The outlet of the first cartridge shall connect to the inlet of the second cartridge. The first cartridge shall contain six 100-micron prefilters and the second cartridge shall contain six 0.5-micron filters or equivalent staging according to type of filtering unit.

B. One spare set of 100-micron prefilters shall be maintained at the site at all times to replace prefilters during cleaning. Maintain at least one set of 0.5-micron or equivalent filters at the site at all times for replacements as necessary.

C. When prefilters become clogged, replace with spares, and wash out the prefilters in the Wash Area allowing drainage from the cleaning operation to go through the filtering system.

D. When the final filters become clogged, remove the filters, replace with new, and dispose of the clogged filters as contaminated waste.

E. Provide a holding tank for contaminated wastewater as required to prevent backup of water into the shower when the amount of water generated exceeds the flow rate of the filters.

3.05 WORK AREA PREPARATION

A. Posting of Danger Signs: Post danger signs in and around the work area to comply with 29 CFR 1926.1101, HIOSH 12-145.1 and all other Federal, State and local requirements. Signs shall be posted at a distance sufficiently far enough away from the work area to permit a person to read the sign and take the necessary protective measure to avoid exposure.

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY
WEAR RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING IN THIS AREA

B. Inspection of Building Openings: At the beginning of each workday, the Contractor shall inspect and ensure that all doors, windows and other openings of affected buildings are closed and locked.

C. Critical Barrier Enclosures: Cover all openings including, but not limited to, glazed openings, doors, corridors, ducts, grilles, floor drains or plates, diffusers, vents, windows, electrical outlets, and any other penetrations to the work areas with two layers of 6-mil plastic and seal with tape.

D. Decontamination System: Provide a decontamination area as described in section 3.1 for exterior work and decontamination enclosure system as described in section 3.2 for interior work.

E. Pre-Cleaning/Wet-Wiping:

1. Pre-clean fixed objects within the work area by using HEPA vacuum equipment and then wet wiping as appropriate. All such fixed object will then be covered in 6-mil plastic sheeting and sealed with tape.

2. Clean the work area using HEPA vacuum equipment and the wet-wiping as appropriate. Do not use dust generating methods such as dry sweeping or non-HEPA vacuuming.

F. Plastic: Objects which may be contaminated during abatement or will be difficult to clean after abatement shall be taped and sealed in 6-mil plastic.

G. Temporary Electricity: Existing Electrical service to the facility may be used for temporary electrical power during abatement and replacement work. However, the electrical power within the work area must be shut off. The contractor shall verify the locations of available electrical service or use generators as needed.

H. Temporary Light: Provide a minimum of 35 foot-candles of illumination on surfaces for finishing operations and 100 foot-candles of illumination for removal operations. Provide 24-volt safety lighting.

I. Temporary Water: Existing water services to the facility may be used as a temporary water source during construction. Locations of line tie-ins must be approved by the Engineer's authorized representative.

J. Temporary Sanitation Facilities: The Contractor shall provide toilet facilities for the use of Contractor personnel and agents during abatement work. Maintain toilet facilities in a clean and sanitary condition in compliance with all applicable Federal, State and local regulations.

K. Temporary Fire Protection: The Contractor shall provide and maintain temporary fire protection equipment during the asbestos abatement operations. Equipment shall be of the appropriate type to fight fires associated with the materials to be found within the work area.

L. Work Area Isolation and Protection: The Contractor shall isolate the work area for the duration of the project. The work area shall be protected subject to the approval of the Engineer's authorized representative.

M. Warning Signs: The Contractor shall post warning signs that meet the requirements of OSHA 29 CFR 1926.1101 (k)(1) and (k)(2)(ii) at the outside door to the Decontamination System. The Engineer's authorized representative may also require that the Contractor post additional warning signs around the work area or at other potential exposure points.

N. AFTER THE POSTING, SEALING AND TEMPORARY FACILITY WORK HAS BEEN COMPLETED, NOTIFY THE ENGINEER'S AUTHORIZED REPRESENTATIVE FOR APPROVAL BEFORE PROCEEDING WITH THE ABATEMENT.

3.06 REMOVAL OF ASBESTOS CONTAINING MATERIALS

A. Surfaces to remain in areas where asbestos containing materials will be removed shall be covered with one layer of 6-mil plastic sheeting. Ventilation intake air sources shall be isolated, or the system shall be shut down.

B. Wet the asbestos containing materials with a wetting agent (amended water) using a fine mist sprayer prior to the start of abatement. Wetting agent shall continuously be applied to control the release of asbestos fibers from the ACM prior to and during removal.

C. Carefully remove asbestos-containing materials by lifting them in whole and unbroken pieces to the greatest extent possible. Continue to apply the wetting agent during removal to control dust. Avoid breaking and pulverizing the material.

D. The Contractor is prohibited from using methods or removal that create excessive amounts of dust and debris.

E. Waste debris shall be double bagged and sealed leak-tight in properly labeled 6-mil plastic bags immediately after removal. The Contractor shall not allow removed ACM to accumulate in work area. All gross debris created by the removal process shall be bagged and sealed before the main break and again at the end of each workday.

F. Asbestos-containing roof material that has been removed from the roof shall not be dropped or thrown to the ground. Material shall be carried or passed to the ground by hand or lowered to the ground via covered, dust-tight chute, crane or hoist.

G. Intact asbestos-containing roof materials and any debris that is not intact shall be lowered to the ground as soon as is practicable, but in no event later than the end of the work shift. While the material is on the roof it shall either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting. Once lowered, unwrapped material shall be transferred to a closed receptacle.

H. The Contractor shall minimize contamination of the work floor, the exterior of disposal containers, and all other surfaces within the work area.

3.07 CLEANUP

A. All contaminated equipment and tools used for removal work shall be washed and cleaned in the work area prior to removing them from the work area. No washing of contaminated equipment and tools will be allowed outside the work area.

3.08 CLEARANCE

A. Remove all visible accumulation of ACM and debris by HEPA vacuums, sponging, and wet wiping.

B. The Engineer’s authorized representative will visually inspect the affected areas for residual asbestos debris and waste. The Contractor shall re-clean areas

showing asbestos debris and waste. If re-cleaning is required, the Engineer's authorized representative will visually inspect for asbestos debris and waste after re-cleaning. This process will be repeated until the Engineer's authorized representative deems the area free of visible asbestos debris and waste.

C. The work area shall be totally visibly clean before the remaining material is encapsulated. After the visual inspection has been passed, encapsulate all remaining materials.

D. Interior Removal Work Area:

1. Upon the approval of the Engineer's authorized representative, the work area shall be completely vacated for at least a 24-hour period after material encapsulation and enclosure to permit the Engineer's authorized representative to collect air clearance samples according to Section 13288 – Testing/Air Monitoring.

2. If the air clearance sample results fail the clearance criteria, the Contractor shall be required to perform additional cleaning and decontamination. Once this has been completed, additional visual inspection and air clearance sampling shall be performed by the Engineer's authorized representative. If additional clearance testing is required due to a failed initial clearance test, the costs of such testing shall be the responsibility of the Contractor.

E. If the work area passes the clearance criteria, the Contractor shall remove all signs, temporary barriers and materials when their use is no longer required.

3.09 DISPOSAL OF ASBESTOS-CONTAINING MATERIAL

A. Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place them in properly labeled transparent 6-mil plastic seamless bottomed bags. Wastes within the bags must be adequately wet in accordance with 40 CFR 61-SUBPART M.

B. Affix a warning and Department of Transportation (DOT) label to each bag or use bags preprinted with the approved warnings and DOT labeling. The name of the waste generator and the location at which the waste was generated shall be clearly indicated on the outside of each container.

C. Vehicles used for transporting waste to the disposal sites shall have a completely enclosed, lockable storage compartment. Storage compartments shall be covered and sealed with a minimum of one layer of 6-mil plastic sheeting on the sides and top and two layers of 6-mil plastic sheeting on the floor. The compartments shall be thoroughly wet-cleaned and HEPA vacuumed following the disposal of each load at the approved disposal sites.

D. Workers unloading bags at the disposal sites shall wear full body protective clothing and dual HEPA cartridge full-face air purifying respirators.

E. Waste disposal manifest forms shall be properly completed to verify custody and ensure disposal of all ACM and asbestos contaminated waste at approved disposal sites. Forms shall be kept on file as directed by the Engineer's authorized representative. Copies shall be submitted to the Engineer's authorized representative no later than the next working day after each trip. It is the Contractor's responsibility to assure that any landfill used for disposal of asbestos-containing or asbestos contaminated waste is approved for that purpose.

3.10 PAYMENT

A. Payment for removal, hauling and disposal of ACM shall be made at the lump sum price bid as scheduled in the Proposal. The final payment will not be made until proper documentation of the disposal of ACM and related waste are submitted to the Engineer.

END OF SECTION

SECTION 13282 - LEAD-CONTAINING PAINT CONTROL MEASURES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Furnish all labor, materials and equipment necessary to complete the safe removal, transportation and disposal of lead-containing paint, including lead-based paint, in areas that may be affected by the renovation activities in compliance with the Specifications and all applicable Federal, State and Local laws and regulations. If there is a conflict with the requirements, the more stringent requirement shall apply. Ignorance of the above requirements and any applicable regulations resulting in additional cost to the Contractor shall not be reimbursable or billable to the State. Any question regarding conflict or inconsistency between Specification and/or regulations should be directed to the Engineer's authorized representative.

B. The lead work shall include, but may not be limited to:

1. Areas including any lead-containing paint (LCP), including lead-based paint (LBP), that is loose and flaking or areas where LCP/LBP has the potential to become airborne or otherwise create dust (i.e. from sanding, drilling, friction, etc.) during the renovation activities. Lead was detected on painted surfaces of structures at the site as specified in *Limited Hazardous Materials Survey Kona Community Hospital, Kealakekua, Hawaii,* dated December 16, 2019, prepared by EnviroServices & Training Center, LLC. The Contractor shall be responsible for conducting a site visit to verify all quantities and material locations.

2. Preparation of work areas and removal, transportation and disposal procedures. All work shall be performed as required of lead-containing and lead-contaminated materials by persons trained, knowledgeable and qualified in the techniques of handling and disposing of lead-containing and lead-contaminated materials and in the subsequent cleaning of lead-contaminated areas. Workers shall be EPA-certified lead workers and capable and willing to perform the work of this contract.

3. Separation and recycling as scrap metal of renovation debris, steel

components and miscellaneous metal elements. Debris and waste resulting from renovation work, except as otherwise specified, shall become the property of the Contractor.

1.02 RELATED SECTIONS

A. Section 01715 – Existing Conditions – Hazardous Materials Survey,

1.03 REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only, and include but are not limited to, the following.

1. CODE OF FEDERAL REGULATIONS (CFR)

a. 29 CFR 1926.33 Access to Employee Exposure and Medical Record

b. 29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists

c. 29 CFR 1926.59 Hazard Communication

d. 29 CFR 1926.62 Lead Exposure in Construction

e. 29 CFR 1926.65 Hazard Waste Operations and Emergency Response

f. 29 CFR 1926.103 Respiratory Protection

g. 40 CFR 260 Hazardous Waste Management Systems: General

h. 40 CFR 261 Identification and Listing of Hazardous Waste

i. 40 CFR 262 Generators of Hazardous Waste

j. 40 CFR 263 Transporters of Hazardous Waste

k. 40 CFR 265 Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

l. 40 CFR 268 Land Disposal Restriction

m. 40 CFR 745 Lead; Requirement for Lead-Based Paint Activities

n. 49 CFR 172 Hazardous Materials, Tables, and Hazardous Materials Communications Regulations

o. 49 CFR 178 Shipping Container Specification

2. HAWAII OCCUPATIONAL SAFETY AND HEALTH DIVISION (HIOSH)

    a. 12-114.2 Personal Protective Equipment

    b. 12-121.2 Fall Protection

    c. 12-122.2 Materials Handling, Storage, Use, and Disposal

    d. 12-148.1 Lead

    e. 12-151 Hazardous Waste Operations and Emergency Response

3. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

    a. ANSI Z88.2 (1992) Respiratory Protection

4. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

    a. HUD Guidelines for the Evaluation and Control of Lea- Based Paint Hazards in Housing

5. UNDERWRITERS LABORATORIES INC. (UL)

    a. UL 586 (1990) High-Efficiency, Particulate, Air Filter Units

1.04 DEFINITIONS

A. Action Level: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period.

B. Authorized Visitor: The Engineer's authorized representative, Inspector, air monitoring personnel, or a representative of any regulatory or other agency having jurisdiction over the project.

C. Competent Person: As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations, has the authority to take prompt corrective actions to control the lead hazards and is an EPA-certified lead inspector or risk assessor.

D. Contaminated Area: An area where unwanted toxic or harmful substance exists.

E. Contractor: For this project, the Contractor is that individual, or entity under contract to the General Contractor to perform the herein listed work.

F. Engineer's Authorized Representative: Authorized Engineer representative who is a Qualified Environmental Consultant (QEC), hired by the Engineer, who performs inspection activities during abatement and renovation work and shall have the authority to initiate engineering controls.

G. EPA: United States Environmental Protection Agency

H. High Efficiency Particulate Air (HEPA) Filter: HEPA filtered vacuuming equipment with a filter system capable of collecting and retaining lead-contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3-micron or larger size particles.

I. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds.

J. Lead-Based Paint (LBP): Protective or decorative coating which contains at least 1.0 mg per square centimeter of lead by area or at least 0.5 percent (5,000 milligrams per kilogram) of lead by weight.

K. Lead Containing Paint (LCP): Protective or decorative coating which contains any detectable quantity of lead; includes Lead-Based Paint.

L. Lead Control Area: A temporary area or structure or containment, sometimes equipped with HEPA filtered local exhaust, that prevents the spread of lead dust or debris. Usually critical barriers and physical boundaries are employed to isolate the lead control area and to prevent migration of lead contamination and unauthorized entry of personnel.

M. OSHA: United States Department of Labor, Occupational Safety and Health Administration

N. Permissible Exposure Limit (PEL): 50 micrograms per cubic meter of air as an 8-hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more or less than 8 hours in a workday, the PEL shall be determined by the following formula:

O. PEL (micrograms per cubic meter of air) = 400/number of hours worked per day

P. Physical Boundary: Area physically roped or partitioned off around lead control area to limit unauthorized entry of personnel.

Q. Qualified Environmental Consultant (QEC): An EPA-certified Lead Inspector/Assessor and who is an Industrial Hygienist or similar safety professional with experience in enforcing lead safety regulations and performing airborne lead sampling.

R. State: State of Hawaii

1.05 QUALITY ASSURANCE

A. Engineer's authorized representative's responsibilities:

1. Review and approve Contractor personnel training.
2. Review and approve Contractor's Work Procedure Plan for conformance to the applicable reference standards.
3. Inspect work for conformance to the Contractor's approved Work Procedure Plan.
4. Schedule and conduct required air monitoring, inspection and reporting.
5. Monitor work to verify that work is performed at all times in accordance with the requirements of this Specification.
6. Monitor work to verify that adequate control is being maintained at all times of hazardous exposure to employees and to the environment.
7. Be onsite during all worksite preparation and cleaning, be available by telephone, pager or answering service at all other times during the work and able to be present at the work site in no more than 2 hours.
8. After final cleanup, verify that the lead control area is free of any visible lead paint chip debris, waste or dust and that final area air samples have lead concentrations at or below the background level.

B. Safety and Health Compliance

1. In addition to the detailed requirements of this Specification, the Contractor shall comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding removing, handling, storing, transporting, and

disposing of lead waste materials.

2. Comply with the applicable requirements of the current issue of 29 CFR 1926.62, HIOSH 12-148.1, and HIOSH 12-202-33.

3. Where requirements of this Specification and the referenced documents vary, the most stringent requirement shall apply.

C. Pre-Construction Conference

1. The Engineer's authorized representative shall meet with the Contractor and Engineer to discuss in detail the work procedures, precautions and area and personal air monitoring to be employed.

2. If rental equipment is to be used during lead-containing material handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Submit a copy of the written notification to the Engineer's authorized representative.

1.06 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor acknowledges that he alone is responsible for the instruction of personnel in and enforcement of personal protection requirements. The Contractor shall comply with all requirements of 29 CFR 1926.62 and HIOSH 12-148.1. The Contractor shall also be responsible for complying with all applicable EPA regulations in regard to lead-containing materials.

B. The Contractor shall examine and have at all times at his office (one copy) and in view at each job site (one copy) the following materials:

1. State of Hawaii Department of Labor and Industrial Relations; Occupational Safety and Health Standards; Part 8, Section 12-148.1;

2. Department of Housing and Urban Development; Office of Public and Indian Housing; Lead Paint Guidelines;

3. Title 29 Code of Federal Regulations Part 1926.62; Safety and Health Standards;

4. Title 29 Code of Federal Regulations Part 1910.134; Respiratory Protection;

5. Title 40 Code of Federal Regulations Part 261; Identification and Listing of Hazardous Waste;

6. Title 40 Code of Federal Regulations Part 262; Standards Applicable to Generators of Hazardous Waste;
7. Title 40 Code of Federal Regulations Part 263; Hazardous Waste Transporters;
8. Title 40 Code of Federal Regulations Part 745; Lead; Requirement for Lead-Based Paint Activities;
9. Copies of any other applicable Federal, State and local regulations, standards, documents and codes;
10. Copies of the procedures to be followed during medical emergencies, including phone numbers of the nearest hospital or other emergency medical facility, which shall be posted by the nearest telephone;
11. Copies of the Contractor's Respiratory Protection Program, Hazardous Communication Program, Safety Program, and Work Procedure Plan;
12. Copies of Safety Data Sheets for all chemicals used;
13. Copies of the Contractor's Competent Person's qualifications and employee training Certificates; and
14. Copies of Personal Air Monitoring results.

C. Whenever approval of the Engineer's authorized representative is required prior to proceeding with other work, the Contractor shall comply with the following:
   1. The Contractor shall give, at a minimum, five (5) days notification to the Engineer's authorized representative prior to the start of any lead work.
   2. The Contractor shall not begin any work without the Engineer's authorized representative present onsite.
   3. The Contractor shall allow the Engineer's authorized representative 24 hours from notification to respond to the request for site inspection(s).
   4. The Contractor shall designate one person (either a foreman or superintendent) who will be authorized to request inspections. The name of the designated person shall be submitted in writing to the Engineer's authorized representative prior to commencing work. Requests from any other person will not be considered official requests.

5. The designated person requesting an inspection shall provide the following information:

    a. Name of caller.

    b. Building and rooms to be inspected.

    c. Work phase of inspection, as specified.

D. Pollution Control: The Contractor shall not contaminate the air, water, soil or other items with hazardous materials such as cleaning solutions, lead-containing paint or lead-contaminated debris and wastes, etc. The Contractor shall immediately clean the contaminated area and dispose of the waste in compliance with all Federal, State and local laws, ordinances, rules and regulations at his or her own expense.

E. Use of Site:

1. Confine operation at the site to the areas permitted under the contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting work while at the project site.

2. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage to the areas authorized by the Engineer's authorized representative.

1.07 COMMENCEMENT OF WORK

A. Each time work that calls for the disturbance of lead-containing paint is to begin in a new work area the Contractor shall not commence work unless the following requirements have been met.

1. Submittals: All submittals, notifications, posting and permits must be provided and be satisfactory to the Engineer's authorized representative.

2. Equipment: All equipment required for the work such as removal, clean-up and disposal must be on hand.

1.08 SUBMITTALS

A. Submit in accordance with section 01330 – Submittal Procedures.

B. Manufacturer's Catalog Data: Submit copies of manufacturer's specifications, installation instructions and field test materials for all chemicals and equipment related to lead-containing and lead-contaminated materials, including any other data that may be required to demonstrate compliance with these Specifications and proposed uses. This includes, but is not limited to, data for vacuum filters and respirators.

C. Safety Data Sheets: Submit copies of the Safety Data Sheets for all chemicals used.

D. Notifications: Submit written notification to the Engineer's authorized representative 15 days prior to the start of any renovation or demolition work involving lead-containing materials.

E. Respiratory Protection Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Respiratory Protection Program prepared in accordance with all applicable laws. The Contractor shall also submit fit test records on all employees to be used on this project who may be required to wear a respirator.

F. Hazard Communication Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Hazard Communication Program prepared in accordance with all applicable laws.

G. Safety Program: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Health and Safety Plan prepared in accordance with all applicable laws.

H. Work Procedure Plan: Submit no later than 10 consecutive working days from notice of award, a copy of the Contractor's Work Procedure Plan. The following are required components of a Work Procedure Plan:

1. A sketch showing the location, size, and details of lead control areas, signage, security, decontamination and support areas including eating, drinking, smoking, and restroom areas;

2. Procedures, interface of trades, sequencing of lead-related work, respirators, protective equipment;

3. A detailed description of the methods of control of the work to ensure that

airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded;

4. Work plan and schedule for waste containment and disposal including daily cleanup and disposal of stray paint chips and paint dust;
5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment;
6. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes;
7. Estimated quantities of wastes to be generated and disposed of as well as a description of the methods used to identify hazardous wastes encountered with the work;
8. Spill prevention, containment, and cleanup contingency measures to be implemented;
9. Description of procedures to stop work in the event that area monitoring and laboratory analysis indicate air concentrations of lead in excess of the action level; and
10. Methods to eliminate runoff of the water used to minimize dust created by renovation work, and collection and disposal plan for wastewater and paint debris.

I. Rental Equipment: When rental equipment is to be used during lead-containing material handling and disposal, a written notification concerning intended use of the rental equipment must be provided to the rental agency with a copy submitted to the Engineer's authorized representative.

J. HEPA Vacuums: Submit no later than 10 consecutive working days from notice of award, manufacturer's certification that vacuums conform to ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems as applicable to this project.

K. Contractor's Competent Person's Qualifications: The Contractor shall submit no later than 10 consecutive working days from notice of award the Contractor's Competent Person's name, contact information, valid qualifications, and current certification of completion of the EPA Lead Inspector/Assessor course.

L. Certification of medical examinations: The Contractor shall submit documentation from a physician that all employees or agents who may be exposed to airborne lead-containing dust or fumes have been medically monitored to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects. In addition, the Contractor shall document that his personnel have received medical monitoring as required in the HIOSH lead standard (12-148.1).

M. Employee EPA Lead Worker/Supervisor Certifications: Submit no later than 10 consecutive working days from notice of award, documentation that each and every individual, including foreman, supervisors, other company personnel or agents, and any other individual who may be exposed to airborne lead dust and who may be responsible for any aspects of lead-containing paint removal activities which may occur, has currently attended and passed the EPA Lead Worker and/or EPA Lead Supervisor course, whichever is relevant to that worker's responsibilities. These courses shall be EPA-approved or approved by a State Accreditation Program in the most current listing of the Federal Register. No worker shall be allowed in the lead control area if they are found to have an expired accreditation certificate. The Contractor shall be responsible for keeping the documentation up to date and submitting subsequent documentation to the Engineer's authorized representative before any additional employee or individual, not currently on the list, is allowed within the lead control area.

N. Employee training certifications: Submit documentation within 10 consecutive calendar days of award, satisfactory to the Engineer's authorized representative, that the Contractor's employees, including foreman, supervisors and any other company personnel or agents who may be exposed to airborne lead dust or who may be responsible for any aspects of lead work activities, have received training in accordance with OSHA 29 CFR 1926.62 and the HIOSH lead standard (12-148.1). Training shall include, but not be limited to, the dangers of lead exposure, respirator use and decontamination procedures.

O. Laboratory Qualifications

1. Personal Air Monitoring Laboratory Qualifications - Submit name, address and telephone number of testing laboratory responsible for analysis of personal air monitoring samples and reporting concentrations of airborne

lead.

2. TCLP Testing Laboratory - Submit name, address and telephone number of testing laboratory responsible for TCLP analysis.

P. Personal Air Monitoring Results: Submit test results to the Engineer's authorized representative and the affected Contractor's employees within three (3) working days of collection, signed by the testing laboratory employee performing the analysis and the Contractor's Competent Person. Test results for the first two full days of initial personal air monitoring shall be submitted to the Engineer's authorized representative within 48 hours after completion of sampling.

Q. TCLP Results: Submit test results to the Engineer's authorized representative within three (3) working days of collection, signed by the testing laboratory employee performing the analysis and the Contractor's Competent Person.

R. Log of Lead Disturbance Work: Complete and submit a daily log of all lead disturbance work performed.

S. Certification of work performance: Certification in writing that the regions both inside and outside of the lead control area have airborne lead concentrations below the background level, that the respiratory protection for the employees was adequate, and that the work procedures were performed in accordance with 29 CFR 1926.62 and this Specification.

T. Waste Disposal Manifest Forms: Submit copies of all transport manifests, trip tickets and disposal receipts for all hazardous waste removed from the work area and disposed of at a disposal facility during the work process.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS

A. Respirators: Select respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. Respirators shall comply with the requirements of 29 CFR 1926.62 and HIOSH 12-148.1. For this project, respirators shall be worn at all times throughout the renovation or as deemed necessary by the Contractor's Competent Person.

B. Protective Clothing: Furnish personnel exposed to lead dust with appropriate personal protective equipment as required by 29 CFR 1926.62 and HIOSH 12-148.1. For this project, respirators shall be worn at all times throughout the renovation or as deemed necessary by the Contractor's Competent Person.

C. Chemicals: Submit applicable Material Safety Data Sheet for all chemicals used on this project. Use the least toxic product approved by the Engineer's authorized representative.

PART 3 - EXECUTION

3.01 LEAD CONTROL AREA REQUIREMENTS

A. Boundary Requirements:

1. Establish a lead control area to contain renovation operations by demarcating a boundary around the structure to be demolished or renovated in accordance with the Contractor's approved Work Procedure Plan. The lead control area shall be isolated by physical boundaries, such as temporary fencing, boundary tape and rope, to prevent unauthorized entry of personnel.

2. Post Warning and Danger signs in accordance with 29 CFR 1926.62 and HIOSH 12-148.1. Signs shall be placed at all approaches to lead control area and at the boundary of the lead control area. Signs shall be posted at all locations where airborne lead concentrations may exceed ambient background levels. Locate signs at such a distance that personnel may read the sign and take necessary protective measures to avoid exposure. In addition, post signs with "Authorized Entry Only, Lead Control Area" and "PPE Required" at every entry point.

B. Personal Protection Requirements:

1. No one will be permitted in the lead control area unless they have been given appropriate training, Personal Protective Equipment (PPE) and medical examinations. PPE is required for all employees and persons within the lead control area.

2. Eating, drinking, smoking and application of cosmetics shall be permitted only in areas designated by the Contractor, approved by the Engineer's

authorized representative, and which are free of dust generated by the renovation. Eating, drinking, smoking and application of cosmetics are not permitted in the lead control area.

3. Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

C. Environmental Protection Requirements:

1. Ensure airborne lead levels outside the lead control area are below the Action Level.

2. Perform work without damage to or contamination of the areas adjacent to locations where lead-containing or lead-contaminated material will be disturbed as a result of renovation activities. If any part of the work area is damaged or contaminated during the disturbance of lead-containing materials, restore the damaged or contaminated area to its original condition or better, as determined by the Engineer's authorized representative.

3. Drainage inlets, downspouts, and all entrances to underground utilities which lie within, or provide drainage for, a lead control area shall be sealed until that lead control area has been cleaned, visually inspected and cleared.

4. Within a lead control area, any windows, doors or vents shall be sealed and air-conditioning units with intake or exhaust in a lead control area shall be shut down and sealed until that lead control area has been cleared with a level of airborne lead below the background level.

D. Exit Procedures: Whenever personnel exit the lead control area, they shall perform the following procedures and shall not leave the workplace wearing any clothing or other equipment worn in the lead control area.

1. Vacuum themselves off with HEPA-filtered vacuum equipment, using UL-586 labeled HEPA filters;

2. Remove protective clothing in the designated changing area within the lead control area and place them in an approved impermeable disposal bag;

3. Wash their hands and faces in the designated changing area before exiting to the designated clean area outside of lead control area; and

4. Prevent migration of mud, dust and/or debris carried on work boots, clothing or equipment from the renovation site into areas beyond the lead control area.

3.02 RENOVATION INVOLVING LEAD-CONTAINING PAINT

A. Perform lead work as specified herein. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when renovation is performed in accordance with 29 CFR 1926.62 and as specified herein.

B. Disturbance of lead-containing paint as a result of renovation activities shall be kept to a minimum. Spot remove lead-containing paint only as necessary for the safe renovation of LCP painted structures. Water spray, vacuuming and other engineering controls shall be used to minimize airborne lead dust. Care shall be taken to avoid pulverizing, scraping, or crumbling lead debris.

C. Dispose of all lead-containing paint and associated waste in compliance with all Federal, State and local requirements.

D. Clean, as needed, all floor surfaces adjacent to the lead control area using a HEPA filtered vacuum.

E. Use 6-mil polyethylene sheeting to cover ground underneath the work area.

F. Use 6-mil polyethylene sheeting to cover any surfaces and equipment that will not be painted, disturbed or utilized during disturbance of lead-containing paint. After completion of work, the Contractor shall repair all damage from fastening and sealing and remove all adhesive residue from surfaces at no additional cost to the State.

G. Manual or power sanding, grinding, abrasive or sand blasting of interior and exterior painted surfaces is not permitted. Select removal processes (describe in the Work Procedure Plan) to minimize contamination of work areas with lead-contaminated dust or other lead-contaminated debris/waste.

H. Open flame burning or torching of lead-containing paint is prohibited.

I. The use of heat guns or hot knives which reach temperatures above 650 degrees Fahrenheit, on surfaces containing lead-containing paint, is prohibited.

J. Use of vacuum equipment without HEPA filters in areas containing lead-containing paint is prohibited.

K. The use of chemical paint strippers containing methylene chloride is prohibited.

L. Control of Airborne Lead Level – The Contractor shall control the lead level outside of the work boundary to less than the action level at all times.

M. Control of Visible Emissions – The Contractor shall control lead dust emissions from the project site so that no visible lead dust emissions leave the project work areas during renovation work. Wet methods or other engineering controls shall be used to control the emission of dust and/or debris from the renovation site in accordance with all applicable Federal, State, and local regulations. Emissions in excess of the above shall be cause for immediate shut down of the project until corrective measures are implemented.

N. Control of Water Runoff – Water used to control emissions of dust from the renovation activities shall not be allowed to flow uncontrolled from a lead control area, to any adjacent area or to enter the sanitary or storm water sewer system. All water runoff from lead control areas shall pass through a filter berm to remove particulate matter prior to discharge to water sewer system. The Contractor shall use only sufficient water to adequately control dust. Under no conditions shall wastewater be disposed of in storm drains or dumped on the ground.

O. Perform renovation involving lead-containing paint as indicated in Federal, State, and local regulations. The worksite preparation (barriers or containments) shall be job dependent.

3.03 CLEANUP

A. Clean surfaces and surrounding ground within the lead control area daily. Do not allow paint chips, dust and debris to accumulate.

B. Restrict and minimize the spread of dust and debris. Keep waste from being distributed over the general area. Do not dry sweep or use compressed air to clean the area.

C. When the operation has been completed, the area will be cleaned of all visible lead contamination. The Engineer's authorized representative will visually inspect

the affected areas for residual lead paint chips and debris, and the Contractor shall re-clean areas showing residual paint chips and debris.

D. If re-cleaning is required, the Engineer's authorized representative will visually inspect for lead debris after the re-cleaning. This process will be repeated until the Engineer's authorized representative deems the area free of visible paint chips and debris.

E. Do not remove the lead control area barriers or roped-off perimeter and warning signs prior to the Engineer's receipt of the Engineer's authorized representative's lead clearance certification.

3.04 DISPOSAL

A. Disposal of Non-Hazardous Lead Construction Debris (TCLP for Lead Not Exceeding EPA Limit of 5.0 Milligrams per Liter):

1. Remove non-hazardous lead waste including debris, scraps, waste materials, rubbish, and trash from the site and dispose of such waste at a landfill approved for such purposes.

2. The Contractor shall submit to the Engineer's authorized representative documentation that the lead-containing waste material removed from the work area has been accepted by the landfill owner.

B. Disposal of Hazardous Lead Construction Debris (TCLP for Lead Exceeding EPA Limit of 5.0 Milligrams per Liter):

1. Collect lead-contaminated wastes, scraps, debris and any other lead-contaminated materials and place into U.S. Department of Transportation approved and appropriately labeled containers.

2. Store lead wastes and debris in U.S. Department of Transportation approved containers in an interim storage area assigned by the Engineer's authorized representative at the site. Any and all hazardous wastes shall be removed from the site to an EPA approved disposal facility within 90 days of the removal work (as applicable).

3. Handle, store, transport, and dispose of lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 264, and 40

CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

4. The Contractor shall submit to the Engineer's authorized representative documentation that the lead-containing waste material removed from the work area has been accepted by the landfill owner.

3.05 CERTIFICATION

A. The Contractor or his authorized representative shall certify in writing that the regions both inside and outside of the lead control area have airborne lead concentrations below the background level, that the respiratory protection for the employees was adequate, and that the work procedures were performed in accordance with 29 CFR 1926.62 and this Specification.

B. Upon inspection and approval of the area by the Engineer's authorized representative, the Contractor shall certify that there were no visible accumulations of lead-contaminated paint, dust and debris remaining on the worksite.

C. The Contractor shall not remove the lead control area boundary and warning signs prior to the submittal and approval by the Engineer's authorized representative of the Contractor's certification that there were no visible accumulations of lead contaminated paint, dust and debris remaining on the work-site.

D. The Contractor shall re-clean areas showing residual paint chips, debris or wastes. Chips, debris and wastes shall be disposed of properly, in accordance with this Specification and all applicable Federal, State and local regulations.

3.06 MEASUREMENT AND PAYMENT

A. Payment for removal, hauling and disposal of all lead-related wastes shall be made at the lump sum price bid as scheduled in the Proposal. The final payment will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-contaminated material delivered is submitted to the Engineer.

END OF SECTION

SECTION 13288 - TESTING/AIR MONITORING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section defines Contractor responsibility for inspection and monitoring while conducting work which disturbs materials that have potential to generate airborne hazards, such as asbestos-containing material (ACM) and lead-containing paint (LCP).

B. Testing and monitoring shall be conducted for the purpose of:

1. Verifying compliance with applicable codes, regulations, and laws regarding working with ACM and LCP.

2. Ensuring that the legally required documentation is collected.

3. Providing engineering controls during project to prevent exposures.

C. Contractor must implement appropriate engineering controls and safety measures to prevent site workers, students, staff/faculty, other trades, the public, and the environment from exposure to hazardous materials. Costs incurred due to Contractor inability to control hazards shall be borne by Contractor, including but are not limited to, investigations, medical, legal, regulatory and public relations, clean-up, monitoring, and reporting.

D. An independent industrial hygiene (IH) firm, retained by the Contractor will conduct project monitoring during the performance of work which disturbs ACM and LCP. IH firm shall have no affiliation with Abatement Contractor.

1.02 RELATED SECTIONS

A. Section 01715 – Existing Conditions – Hazardous Materials Survey.

1.03 DEFINITIONS

A. Abatement Contractor: Firm engaged to remove, encapsulate, and/or dispose of ACM and LCP waste.

B. Contractor: General Contractor of the Heat Abatement contract.

C. HUD: United States Department of Housing and Urban Development

D. Industrial Hygienist: Qualified industrial hygienist who will oversee and direct the project monitoring. His/her qualifications shall include at minimum five years of experience in industrial hygiene and relevant hazard abatement projects in K-12 schools. IH shall possess the State of Hawaii Asbestos Project Designer, Lead-Based Paint Risk Assessor or equivalent certifications.

E. Industrial Hygienist Technician: Technician who works directly under the supervision of the IH and conducts daily project monitoring and collect relevant data and samples.

F. Independent IH Firm: IH firm retained by the Contractor to inspect the Work during the removal, encapsulation, and disposal of ACM or LCP and is capable to perform air monitoring, sampling and testing prior to, during, and after material removal or mitigation.

1.04 COORDINATION

A. Testing/air monitoring requirements included in the scope of work shall be coordinated with Section 01715 – Existing Conditions – Hazardous Materials Survey and Section 13282 - Lead-Containing Paint Control Measures.

1.05 PRE-CONSTRUCTION MEETING

A. A meeting shall be held prior to site work and shall be conducted by Contractor.

B. Attendance: Contractor, Owner, Industrial Hygienist, and Competent Person shall attend.

C. Agenda:

1. Review final schedule for project.
2. Review legal requirements and special and sensitive conditions and constraints.
3. Verify compliance with pre-construction requirements, and obtain a copy of notifications.
4. Review engineering controls, personal protective equipment, abatement equipment, and hazard control measures for workers, the students, staff/faculty, other trades, the public, and the environment.
5. Review work procedures and responsibilities.

6. Clarify the scope of work and its impact on the users of the building and the campus.

1.06 TESTING/AIR MONITORING/INDUSTRIAL HYGIENE SUPERVISION

A. Industrial hygiene supervision and air monitoring shall be performed by an independent IH firm selected, retained, and paid for by the Contractor. IH firm shall not be paid by the Abatement Contractor.

B. Laboratory used for sample analysis shall be proficient in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) program.

C. Air monitoring and project supervision shall be performed under the direction of an IH.

D. On-site air monitoring and project supervision may be performed by a qualified industrial hygiene technician (IHT), provided all activities are performed under the supervision of the IH.

1.07 DESCRIPTION OF WORK:

A. Furnish labor, materials, and equipment necessary to carry out the plan/preparation, hazard mitigations, hazardous material removal, personnel monitoring, record keeping, and proper disposal in compliance with applicable federal, state and local laws and regulations during the performance of the project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 COMPETENT PERSON'S RESPONSIBILITIES

A. Contractor's competent person shall prepare an Asbestos Removal and Disposal Plan per 13281 Part 1.05 B.

B. Refer to Sections 13281 part 3.03, below, for additional responsibilities.

C. Contractor's competent person shall prepare a Lead Hazard Control Plan per Section 13282 Paragraph 1.05 B.

D. If required by the landfill, Competent Person shall provide Toxicity Characteristic Leaching Procedure (TCLP) results and waste documents. In the event that the waste is determined to be hazardous, inform State Engineer to obtain EPA ID number and to request equitable adjustment to the contract.

E. Refer to Sections 13282 and part 3.03, below, for additional responsibilities.

F. Refer to Sections 13286 part 3.03, below, for additional responsibilities.

3.02 CONTRACTOR RESPONSIBILITIES

A. Contractor is responsible for submitting complete work plans for review and concurrence by the Owner. Refer to Sections 13281, 13282, 13286 for requirements of the work plan.

B. Contractor is responsible for worker monitoring and necessary records for the Contractor's employees as required by OSHA (29 CFR 1926.58), Hawaii Administrative Rules, and other applicable laws.

C. Contractor shall obtain legally required documentation for air monitoring and submit a written respiratory protection program as part of the contract.

D. Costs involving investigations, air monitoring, legal, medical, regulatory and public relations, testing, and reporting due to Contractor failure to control hazards shall be borne by Contractor, and shall be deducted from the final contract payment.

E. Additional testing performed by the IH shall be accommodated by Contractor but shall not remove Contractor’s responsibility of monitoring required by law and contract specifications.

F. For final cleanup and decontamination following gross removal, remove the final polyethylene sheeting, or drop cloth, but leave the coverings for critical barriers, such as doors, windows, air ducts, etc., until successful clearance is obtained.

G. Asbestos Clearance

1. IH retained by the Contractor and Contractor’s Competent Person shall jointly conduct visual inspection, and the IH will conduct air clearance prior to releasing the space to other trades. The clearance samples will be analyzed by Phase Contrast Microscopy (PCM) for indoor samples or Transmission Electron Microscopy (TEM) for conflict resolution samples.

2. PCM clearance result shall be less than 0.01 fibers per cubic centimeter of air (f/cc) or lower.

3. TEM sampling and analysis shall be used for settling any disputes. No indoors TEM samples shall exceed 70 structures per millimeter squared.

H. Lead Clearance: IH retained by the Contractor and the Contractor's Competent Person shall visually inspect the affected surfaces for residual lead paint chips and accumulated lead-containing dust after the work is completed. Lead-in-dust wipe samples shall be collected once visual inspection passed.

I. Additional area air monitoring and/or testing necessary as a result of insufficient cleanup efforts by Contractor shall be borne by Contractor.

J. The Contractor shall perform the Toxic Characteristic Leaching Procedure (TCLP) for Lead testing on all solid waste debris contaminated with lead (with the exception of painted scrap metal), in accordance with 40 CFR Part 261 "Identification and Listing of Hazardous Waste". The Contractor shall dispose of lead debris as hazardous waste if the waste is determined to be hazardous by the TCLP-Lead testing. If the TCLP-Lead testing indicates that the waste is non-hazardous, the Contractor shall dispose of the waste as non-hazardous, construction waste.

3.03 MONITORING AND INSPECTIONS BY COMPETENT PERSON

A. Duties of the Competent Person:

1. Photographic Record of Project: Record work with representative photos. Photos shall become the property of the State and are to be accompanied by a detailed log.

2. Project Log: Competent Person shall be on site at all times and maintain daily field logs detailing key activities during ACM removal and LCP-related work, and submit a summary of project activities to the Owner within 10 days of completion for each campus. Incorporate daily field reports with other project data into a final closeout report.

3. Visual Inspection of Controlled Areas: Perform inspections of controlled areas. Conduct inspections during the actual work performance to document the work practices employed. Verify that scheduled abatement or mitigation work is completed, and the area was properly and promptly cleaned and

ready for other trades involved in the project.

4. Change Order: If changes are necessary once construction begins, review request for change and make a recommendation for approval. Per Section 13282 Paragraph 3.16, removal activities and disposal of wastes will not be measured or paid separately, except for the hazardous waste determined by the TCLP testing (Section 13282 Paragraph 3.14).

B. Site Monitoring by Competent Person.

1. Onsite personnel air monitoring as required by OSHA, and the project specifications.

2. Monitoring of decontamination procedures at control area entry/exit and of cleanup after each shift.

3. Monitoring of controlled area maintenance and waste handling

4. Interface with IH, hospital representatives, representatives of regulatory agencies, and the Owner.

5. Ensure workers are trained, engineering controls in place, and proper respiratory protection is utilized by personnel within control areas.

6. Relay to the Owner any discrepancies in Contractor's action with provisions of project specifications.

3.04 TESTING/AIR MONITORING

A. IH retained by the Contractor shall have authority to stop work or to exercise engineering controls during the project.

B. IH may conduct additional testing and air monitoring at his/her discretion.

C. Monitoring activities shall be documented and submitted to Owner with test results, interpretations, follow-up actions, and final resolutions.

3.05 MEASUREMENT AND PAYMENT

A. Work involving worker monitoring, TCLP testing, and compliance for removal and disposal of lead shall not be measured or paid for separately but shall be considered incidental to the lump sum price bid for the item of which it is a part in the Bid Schedule.

END OF SECTION

DIVISION 15 – MECHANICAL

SECTION 15000 – GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 WORK DESCRIPTION

A. The Contractor shall furnish all labor, materials, tools and equipment, and perform all work and services necessary for complete and properly operating mechanical systems, as shown on the drawings and as specified, in accordance with provisions of the contract documents and completely coordinate his work with that of all other trades.

B. The Contractor shall completely examine the contract documents and shall report to the WHFD AND/OR PROJECT MANAGER any error, inconsistency or omission he discovers. Bidders are cautioned to review the technical specifications carefully and thoroughly. The submittal of a bid shall be considered an acceptance of the specifications as published. Protests concerning the technical specifications lodged after bid opening shall not be considered.

C. The Contractor shall visit the site and examine the conditions affecting his work before submitting his proposal. The submission of the proposal shall be considered evidence that the Contractor has visited the site and no extra payments will be allowed to the Contractor for extra work made necessary by his failure to visit the site.

D. Provide all supplementary or miscellaneous items, hangers, supports, details, appurtenances and devices incidental to or necessary for a sound, secure, complete and operating mechanical system where work required is not specifically indicated.

E. Drawings and specifications shall be taken together. Provide work specified or stated in one or the other document as though mentioned in both documents.

F. Substitution of another manufacturer's product for materials or equipment specified and for items with “approved equal” after the brand name requires approval in accordance with the SPECIAL PROVISIONS. Equal products are acceptable in lieu of those specified hereinafter by specific manufacturer and model number if approved.

G. The Contractor shall warrant that all materials and equipment furnished under this contract will be new and that all work will be good quality, free from faults and defects and in conformance with the contract docum ents for a guarantee period of one year.

H. The Contractor shall maintain at the site one copy of all drawings, specifications, addenda, approved shop drawings, change orders and other modifications, in good order and marked to record all changes made during construction. These documents shall be made available to the WHFD AND/OR PROJECT MANAGER upon request.

I. The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the work, he shall remove all his waste materials and rubbish from and about the project as well as all his tools, construction equipment, machinery and surplus materials and shall clean all new equipment, materials, items and accessories.

J. The Contractor shall give the WHFD AND/OR PROJECT MANAGER timely notice of his readiness for testing any work including the scheduling of agencies with the jurisdiction over the work, test equipment and personnel, and all other data and arrangements for the WHFD AND/OR PROJECT MANAGER to observe the testing. The Contractor shall bear all cost of such tests.

K. Workmanship and Materials:

1. Workmanship shall be of the best quality and none but competent mechanical workers skilled in their trades and thoroughly familiar with the work involved shall be employed. The Contractor shall furnish the services of an experienced superintendent, who will be constantly in charge of the work, until the project is completed and accepted.

2. References to standards are intended to be the latest revision of the standard specified.

3. Unless otherwise specified later in this section, each article of its kind shall be the standard product of a single manufacturer.

4. Whenever the words “or approved equal” or other words of similar intent or meaning are used, implying that judgment is to be exercised, it is understood that it is the judgment of the WHFD AND/OR PROJECT MANAGER.

5. The WHFD AND/OR PROJECT MANAGER shall have the right to accept or reject material, equipment and/or workmanship and determine when the Contractor has complied with the requirements specified in this section and all technical sections that refer to this section.

6. All manufactured materials shall be delivered and stored in their original containers. Equipment shall be clearly marked or stamped with the manufacturer’s name and rating. Equipment and materials shall be carefully handled, properly stored and adequately protected to prevent damage before and during installation, in accordance with the manufacturer’s recommendations and as approved by the WHFD AND/OR PROJECT MANAGER. Damaged or defective items, in the opinion of the WHFD AND/OR PROJECT MANAGER, shall be replaced.

1.03 CONTRACT DRAWINGS

A. Contract drawings are essentially diagrammatic, indicating general layout and approximate locations toward establishing the scope for uniform estimating basis for all bidders. They are not intended to be detailed construction working drawings. Equipment, ductwork and piping arrangements shall fit into space allotted and shall allow adequate clearances for servicing and maintenance. Reasonable modifications to indicated locations and arrangement to suit job conditions shall not constitute basis for requesting additional funds from the WHFD AND/OR PROJECT MANAGER.

B. Because of the small scale of drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Contractor shall carefully investigate structural and finish conditions affecting his work and arrange such work accordingly, furnishing such fittings, traps, valves, ductwork, piping, supports, and accessories as may be required to meet such conditions.

C. Verification of Dimensions: The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, to verify all dimensions in the field, and to advise the WHFD AND/OR PROJECT MANAGER of any discrepancy before performing any work.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. The general requirements for submittals are specified in this section and shall apply to all mechanical sections. Additional submittal requirements are specified in each mechanical section.

C. Within 20 days after award of contract and before installation of any materials or equipment is begun, Contractor shall submit to the WHFD AND/OR PROJECT MANAGER for approval a complete list of materials and equipment together with names and addresses of manufacturers and local Hawaii based manufacturer's representatives, catalog numbers, and trade names; and, annotated descriptive data showing the specific model, type, and size of each item the Contractor proposes to furnish. No consideration shall be given to partial lists submitted from time to time. Prepare working drawings on sheets not smaller than 24 inches by 36 inches, and include data essential to the proper installation of the system. Do not commence work until the design of the system and the various components have been approved.

D. Approval of materials and equipment will be based on manufacturer's published rating. Any materials which are not in accordance with these specifications may be rejected. Contractor shall not order materials and equipment without the submittal first being approved. Ordering of material and equipment without prior approval may be rejected by the WHFD AND/OR PROJECT MANAGER.

E. Prior to start of any field work, required copies of to scale shop drawings of equipment, ductwork, piping and controls shall be submitted for review. No work shall be started without approval from the WHFD AND/OR PROJECT MANAGER. Where apparatus and equipment have been indicated on the contract drawings, dimensions have been taken from typical equipment of the

class indicated. The shop drawings shall show the details of construction and installation of the particular equipment being furnished. The shop drawings shall be fully dimensioned to show the equipment, materials and connections fit the space provided.

1. Contractor shall check the submittals and shop drawings and certify they are correct and in compliance with the contract drawings and specifications.

2. Review of shop drawings by the WHFD AND/OR PROJECT MANAGER's representatives is confined to arrangement of equipment and fixtures only and does not relieve the Contractor from responsibility for proper fit, performance and construction. Any deviation from the contract drawings and specifications shall be clearly noted on the shop drawings. Since manufacturing methods vary, reasonable variations from the contract documents are acceptable; however, performance and material requirements indicated are the minimum acceptable and the WHFD AND/OR PROJECT MANAGER retains the right to judge the equality of any variation.

F. Unless otherwise specified here, submit 6 copies of each submittal required for approval:

1. Shop drawings: Submit prints of dimensioned shop drawings, indicating equipment layout, piping, hangers, equipment bases, support details, wiring diagrams for control, and locations and sizes of pipe sleeves and duct openings. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices and components. Coordinate drawings with other trades to avoid interferences. Drawings shall be minimum 24 inches by 36 inches in size, except as specified elsewhere. Provide one set of reproducible transparencies and 6 sets of bond prints. Approval of shop drawings does not relieve the Contractor from responsibility of a complete installation or proper performance. No work shall commence until shop drawings are approved by the WHFD AND/OR PROJECT MANAGER.

   a. The Contractor shall review, stamp with his approval, and submit all shop drawings required by the contract documents.

   b. At the time of submission, the Contractor shall inform the WHFD AND/OR

PROJECT MANAGER in writing of any deviations in the shop drawings from the requirements of the contract documents.

c. By approving and submitting shop drawings, the Contractor certifies that he has determined and verified all field measurements and obstructions, field construction criteria, materials, catalog numbers and similar data, that he has checked and coordinated each shop drawing with the requirements of the work and of the contract documents and that all equipment fits within designated spaces.

2. Samples: Submit samples of materials which accurately represent if not identical to the materials to be used. Where samples are specified to demonstrate method of installation, furnish all materials, labor, ingredients and tools. Samples shall also be furnished when materials are proposed as substitutions for those specified. Materials used in the work shall be identical to samples that have been approved by the WHFD AND/OR PROJECT MANAGER.

3. Certificates of conformance or compliance:

   a. Submit certification from the manufacturer attesting that materials and equipment to be furnished for this project comply with the requirements of this specification and of the reference publications. Preprinted certifications will not be acceptable; certifications shall be in the original. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as “as good as”, “achieve the same end use and result as materials formulated in accordance with the referenced publication”, “equal or exceed the service and performance of the specified material”. The certification shall simply state that the product conforms to the requirements specified.

   b. Standards compliance: When materials or equipment are specified to conform to the standards of organizations such as the American National Standards Institute (ANSI), Air Conditioning and Refrigeration Institute (ARI), Air Movement and Control Association (AMCA), American Society for Testing and Materials (ASTM), Factory Mutual Engineering and

Research Corporation (FMERC or FM), National Electrical Manufacturers Association (NEMA), National Fire Protection Association (NFPA), and Underwriters Laboratories (UL), proof of such conformance shall be submitted to the WHFD AND/OR PROJECT MANAGER for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu of the label or listing, the Contractor may submit a certificate from an independent testing organization, which is competent to perform acceptable test and is approved by the WHFD AND/OR PROJECT MANAGER. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard. For materials and equipment whose compliance with organizational standards of specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product and the referenced standard and shall simply state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the referenced standards listed.

4. Product data: Submit data of equipment showing manufacturer's name, trade name, catalog model or number, project specification and paragraph reference, material specifications, performance data, certified dimensions and motor sizes. Performance data shall meet the criteria and standards specified in the technical sections for the model being furnished. Submit 8 complete sets. Equipment and material shall not be ordered without prior approval of the submittal from the WHFD AND/OR PROJECT MANAGER.
5. Reports: Submit as required by individual technical sections.
6. Operation and maintenance manual: Submit one bound copy and 3 electronic copies on CD of the Operation and Maintenance Manual on all equipment and the system as a whole as required by individual technical sections.
7. Equipment or fixture listing: Submit a complete list of equipment and fixtures together with names and addresses of manufacturers and the Hawaii based

authorized representative, catalog numbers, and trade names.

8. Maintenance service contract: Submit copies of the Maintenance Service Contract, countersigned by the Contractor, which will validate the guarantee as required by individual technical sections.

9. As-built drawings: Record changes from the contract drawings of all concealed piping. Show exact locations and sizes, as actually installed, of mechanical equipment, piping, isolating valves and items requiring maintenance or inspection. Dimension underground piping from a visible point on structure. Keep at the job site a complete, accurate record of all approved deviations from the contract drawings, shop drawings and specifications. Keep these changes on reproducible prints of the drawings affected and submit to the WHFD AND/OR PROJECT MANAGER at the completion of the project.

10. Guaranty or warranty: Submit a written guaranty on all equipment, piping, accessories and material furnished against all defects in material and workmanship as required by individual technical sections.

1.05 LAWS, REGULATIONS AND CODES

A. The following shall govern where applicable; the Plumbing Code, State of Hawaii Department of Health Regulations, Uniform Building Code, OSHA Rules and Regulations and all other codes and standards referenced in these specifications and as adopted by the Hawaii County. Where requirements differ in these codes and standards, the more stringent shall apply.

1.06 PERMITS AND INSPECTIONS

A. Obtain and pay for all fees, permits, licenses, assessments, connection charges and inspections required for this project.

B. The Contractor shall apply and pay for all necessary inspections required by any public authority having jurisdiction.

1.07 MANUFACTURER'S RECOMMENDATIONS

A. Fixtures installed under this division of the specifications shall be installed according to the manufacturer's recommendations, unless otherwise shown on the drawings or specified in this section. Where installation procedures or any

part thereof are required to be in accordance with the recommendations of the manufacturer of the equipment being installed, printed copies of these recommendations shall be furnished to the WHFD AND/OR PROJECT MANAGER, prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause or rejection of the fixture.

B. Certain specified construction and details may not be regularly included in the manufacturer's catalogued product. The Contractor shall provide the material or equipment complete as specified.

1.08 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Bound Instructions: Unless otherwise indicated, furnish one hard copy and 3 electronic copies on CD of an operation, maintenance, and troubleshooting manual for each item of equipment and the system as a whole. Furnish the manual bound in hardback binders or an approved equivalent. Furnish one complete manual prior to the time that equipment tests are performed and furnish the remaining manuals before the contract is completed. Inscribe the following identification on the cover; the words OPERATION AND MAINTENANCE MANUAL, the name and location of the building, the name of the Contractor, the name of the Consultant, date, and the contract number. The manual shall include the names, addresses and telephone numbers of each subcontractor installing equipment and of the local representative for each item of equipment. Also include a list of equipment by manufacturer, with the model number and serial number, tag number, quantity of each unit, location of unit, and area served. When standard manufacturer's brochures are used, adequately indicate (highlight, arrow, etc.) the project related information and delete (X or cross-out) the non-applicable information. Flysheet or divider sheet shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8 1/2 by 11 inches, with large sheets of drawings folded in. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include:

1. System layout showing equipment, ductwork, piping, controls, etc.;

2. Wiring and control diagrams with data to explain detailed operation and control of each item of equipment;
3. Description of the function of each principal item of equipment;
4. The procedure for operating;
5. Shutdown instructions;
6. Maintenance instructions;
7. Lubrication schedule including type, grade, temperature range and frequency;
8. Manufacturer's bulletins, cuts and descriptive data;
9. Safety precautions, test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts and the service organization that is reasonably convenient to the project site.

B. The manual shall be complete in all respects for equipment, controls, accessories and associated appurtenances provided.

1.09 SPARE-PARTS DATA

A. After approval of materials and equipment and one month prior to the date of beneficial occupancy, the Contractor shall furnish a complete list of parts and supplies, with current source of supply.

1.10 SUBSTITUTION OF EQUIPMENT OR MATERIAL

A. Design is based on fixtures and material as described in drawings. Any changes in equipment, bases, piping, connections, controls, electrical equipment specified and required by the approved substitutions shall be made by Contractor at no additional cost to the WHFD AND/OR PROJECT MANAGER. Contractor shall ensure proper fit, clearances, compatibility with other trades (e.g., electrical, ceiling, etc.), compatibility with controls and communication with the controls system, operation and maintainability for any equipment or material that is substituted for that indicated.

1.11 DISCREPANCIES

A. The drawings and specifications are intended to be cooperative. Any materials, equipment or system related to this division and exhibited on the electrical or mechanical drawings but not mentioned in the specifications are to be executed to the intent and meaning thereof, as if it were both mentioned in the specifications and set forth on the drawings.

B. In case of differences between the drawings and specifications, the specifications shall govern first, and then the drawings. Large-scale details shall take precedence over small-scale drawings as to the shape and details of construction. Specifications shall govern as to materials.

C. Drawings and specifications are intended to be fully cooperative and to agree, but should any discrepancy or apparent difference occur between drawings and specifications or should errors occur in the work of others affecting the work, the Contractor shall notify the WHFD AND/OR PROJECT MANAGER at once. If the Contractor proceeds with the work affected without instructions from the WHFD AND/OR PROJECT MANAGER, he is responsible for that change and shall correct any resultant damage, rework, extra work or defect at no additional cost to the WHFD AND/OR PROJECT MANAGER. All interpretations of drawings and specifications shall be clarified by the WHFD AND/OR PROJECT MANAGER.

1.12 OMISSIONS

A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions, the Contractor shall call the attention of the WHFD AND/OR PROJECT MANAGER to such omissions in 15 days advance of the date of bid opening so the necessary corrections can be made.

1.13 GUARANTEE AND CERTIFICATE

A. The Contractor shall guarantee and certify in writing the following items:

1. All equipment, piping, accessories and material furnished for a period of one year commencing after 30 consecutive days of trouble-free operation from date of final acceptance against all defects in material and workmanship. If any equipment, piping or material fails, does not operate satisfactorily or shows undue wear, the Contractor will be notified, and shall be required to

correct the defect and damage to other work caused by such defect, immediately and at no additional cost to the WHFD AND/OR PROJECT MANAGER. If the above period of warranty does not coincide with the manufacturer's standard warranty period, the Contractor shall include all costs for extending the warranty for the period specified above in his bid.

2. All equipment, piping and materials to provide the results specified or shown.
3. All equipment to be properly installed in strict accordance with manufacturer's recommendations and to be free of vibration or objectionable noise.
4. All piping to be drip free and properly installed to be free of vibration, pounding or objectionable noise.

B. The above guarantee shall not be interpreted as voiding, limiting or reducing any equipment manufacturer's warranty or any guarantee permitted by law.

C. The WHFD AND/OR PROJECT MANAGER shall have the right to require a written certificate, dated and signed by a responsible employee of the Contractor, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Whenever a regulatory agency performs inspections or tests of any portion of the work, a certificate shall be furnished by the Contractor that the inspection or test was satisfactorily passed.

D. The Contractor shall provide a written guarantee that all work is as specified, and shall be bound to reinstall material or equipment defective due to workmanship or materials for a period of one year from the date of final acceptance of the installation by the WHFD AND/OR PROJECT MANAGER. Contractor shall not be responsible, however, for defects proven to the WHFD AND/OR PROJECT MANAGER satisfaction to be due to misuse, accident or negligence by other parties.

E. Further, the Contractor shall be held responsible for all damages to any part of the premises, building or contents caused by leaks or other defects in pipe, equipment or materials provided under this specification, of a period of one year from the date of final acceptance of the installation by the WHFD AND/OR PROJECT MANAGER.

F. Terms of this guarantee are in addition to other guarantee provisions of the specifications, and do not substitute for other more stringent terms, if any.

1.14 ELECTRICAL WORK

A. All power wiring, including final hookup to all mechanical equipment will be provided under the Division 16 – ELECTRICAL of this specification. The power wiring, conduits and appurtenant work including connection to the mechanical equipment and control devices shall be provided by the Electrical Subcontractor.

B. Electrical work under Division 16 – ELECTRICAL of the specifications is based on the electrical rating of equipment indicated on the mechanical drawings. Additional electrical work caused by any deviation under the requirements of the Division 15 – MECHANICAL drawings and specifications shall be paid for by the Mechanical Subcontractor.

C. All control wiring for communication, signals and control power less than 100 volts are included under mechanical work and shall be in accordance with Division 16 – ELECTRICAL requirements, except where specified otherwise in Division 15 – MECHANICAL.

D. The Mechanical Subcontractor shall furnish all control transformers, motor controllers, any disconnect devices specified as part of the mechanical equipment and any other electrically powered devices for installation by the Electrical Subcontractor. The Mechanical Subcontractor shall turn over these items to the Electrical Subcontractor at the site after receipt of notice from the Electrical Subcontractor that he is ready to install said items. The Electrical Subcontractor shall install these devices and provide the labor and materials to connect to the power system.

1.15 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Furnish new equipment, materials and accessories bearing the manufacturer's identification. Coordinate deliveries to avoid interference or construction delays. Protect products during delivery, storage, installation, and the remainder of the contract period after installation.

1.16 CONTINUITY OF SERVICES, PHASING

A. The facility will be in use during construction of this project. It is intended that interruption of utilities be kept to a minimum. Notice of service interruptions shall be submitted to the WHFD AND/OR PROJECT MANAGER for approval at least 2 weeks before intended date of service interruptions. Exact date and time of interruption allowed shall be determined by the WHFD AND/OR PROJECT MANAGER. Provide temporary valves, connections, piping, etc., as necessary to assure this continuity of service; they shall be furnished under this section without additional charge to the WHFD AND/OR PROJECT MANAGER and shall be removed when no longer necessary. Air conditioning shall be operational at 6:30 a.m. every morning after an evening service interruption, to support normal office operations.

B. Work shall be done outside of regular working hours (5:00 p.m. to 6:30 a.m.) and on weekends, except where otherwise arranged with the project coordinator.

C. The Contractor shall submit to the WHFD AND/OR PROJECT MANAGER a copy of his work schedule indicating the date and area to be affected by his work. This schedule shall be updated weekly during on-site work and submitted.

D. Execute work using such methods, techniques, connections and tie-ins which will cause least interference with, and interruptions of, existing utilities and services. Keep roads clear of materials, debris. etc. to the maximum extent possible. Schedule all arrangement for work that will cause interferences or interruptions, in advance with the WHFD AND/OR PROJECT MANAGER, all other affected trades and authorities having jurisdiction.

E. Examine site and become familiar with existing local conditions affecting work.

F. Examine all drawings and specifications, including electrical, and become familiar with the types and systems of construction to be used. Determine how such types and systems will affect the installation of mechanical work.

G. Investigate, determine and verify locations of any overhead utilities on or near site. Determine such locations in conjunction with all public and private utility companies and with all authorities having jurisdiction.

1.17 OPENINGS, CUTTING AND REPAIRING

A. The Mechanical Contractor shall cooperate with the work to be done under other sections in providing information as to openings required in walls and slabs for all piping including sleeves where required.

B. Any drilling or cutting required for the performance of work under this section shall be the responsibility of the Contractor and the cost there shall be borne by him.

C. Holes in Concrete: The Mechanical Contractor shall pay all costs for cutting holes. All holes through existing concrete shall be either core drilled or saw cut. All holes required shall have the approval of the WHFD AND/OR PROJECT MANAGER prior to cutting and drilling. Contractor is responsible for protection of lower floors or adjacent spaces during core drilling or saw cutting, including protecting from water and slurry damage to existing surfaces and equipment.

D. It shall be the responsibility of the Contractor to determine that all openings are properly located.

PART 2 - PRODUCTS

2.01 MATERIALS AND FIXTURES

A. As specified in all sections of Division 15 – Mechanical.

B. Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use at least 2 years prior to bid opening. Where 2 or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer except where specified. Each item of equipment shall have the manufacturer's nameplate. Name of the distributing agent in lieu of the manufacturer's nameplate will not be acceptable.

C. All materials shall be new, of equivalent or better quality than of materials specified. For ease of maintenance and parts replacement, select equipment

from a single manufacturer as much as possible. Substitutions require pre-bid approval.

2.02 NAMEPLATES

A. Each item of equipment shall have manufacturer's nameplate of corrosion resisting metal attached in a conspicuous location. Nameplate data shall include manufacturer's name, address, model number, serial number, capacity, rating and such other performance data as required to completely identify the item. In addition, the manufacturer shall provide a separate corrosion resisting metal tag or plastic, unless specified otherwise, to carry the equipment designation as shown on drawings. Except as otherwise specified nameplate lettering shall be stamped or engraved on the nameplate. Nameplates shall be fastened by means of corrosion resisting metal screws, rivets or wire, 14-gauge. In addition, each piece of equipment shall be provided an identification tag in accordance with the paragraph entitled “Identification Tags for Mechanical Equipment and Devices”.

2.03 TOOLS AND SUPPLIES

A. Special tools and supplies shall be provided if required to maintain equipment provided for this project. The items shall be packaged or boxed to provide protection in storage, and shall be identified as to use. Tools and supplies shall be accompanied by information as to source of supply.

2.04 FACTORY-APPLIED PAINT

A. Ferrous surfaces of equipment shall have baked enamel finish painting as standard with the manufacturer. Special coating shall be applied when specified in the technical sections, and in such cases the coating used shall be certified in compliance with the certificates paragraph in this section.

PART 3 - EXECUTION

3.01 VERIFICATION OF DIMENSIONS

A. The Contractor shall check all dimensions at the site and shall establish all lines and levels. The Contractor shall be responsible for correctness of all dimensions and fitting of equipment, ductwork, fixtures and piping into the available space. Should field measurements show conditions that require relocation of any work,

such conditions shall be reported to the WHFD AND/OR PROJECT MANAGER in advance of installation, and the work shall proceed in accordance with his decisions.

3.02 PROTECTION OF WORK IN PROGRESS

A. Ducts, conduits (if provided by Division 15 – MECHANICAL technical specifications) and pipe openings shall be closed with caps or plugs until connections are made. Equipment shall be securely covered for protection against physical or chemical damage. In areas exposed to weather, materials unused at the end of each day's work shall be stored in weather-protected locations. Damage to materials or equipment due to the Contractor's neglect shall be repaired or replaced to the satisfaction of the WHFD AND/OR PROJECT MANAGER by, and at the expense of the Contractor.

3.03 LOCAL TECHNICAL SUPPORT

A. The mechanical equipment suppliers that furnish equipment for this project shall have a local Hawaii sales and service office, staffed with factory trained representatives fully capable of providing instruction, routine maintenance and emergency maintenance service on all system components supplied for this project. If the maintenance service is provided by a separate company, that company shall be specifically trained by manufacturer and authorized to perform maintenance on the equipment furnished for this project.

3.04 SAFETY REQUIREMENTS

A. Belts, pulley, chains, gears, couplings, projecting setscrews, keys and other rotating parts located so that any person can come in close proximity thereto shall be fully enclosed or properly guarded. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of a type as specified in other mechanical sections. Items such as catwalks, ladders and guardrails shall be provided where required for safe operation and maintenance of equipment.

3.05 PAINTING

A. Unless specified in other mechanical specification sections, the Contractor shall be responsible for complete coverage in painting all exposed ferrous metal that has not been factory finish coated.

3.06 PIPING IDENTIFICATION

A. Identification of all new pipe lines shall be by means of paint and colored, waterproof, all temperature, self-adhering labels and directional arrow. Color coding shall be as follows:

TEXT	PAINTED PIPE COLOR	SNAP ON BACKGROUND COLOR	TEXT & ARROW COLOR
Potable Water	Green	Green	White
Chilled Water	Insulated White	Green	White

B. All exposed pipes, whether insulated or not shall be identified. Labels may be omitted from piping where the use is obvious, due to its connection to equipment and where the appearance would be objectionable in finished rooms, as approved by direction.

C. Identification labels shall be placed as follows:

1. Near each valve and branch connection.
2. Wherever piping merges or disappears from view from the floor of the room in which it is installed.
3. Labels shall not be more than 50 feet apart.

3.07 VALVE INDEX

A. The Mechanical Contractor shall provide brass tags on all valves with letters stamped thereon designating service of each valve.

B. Provide a valve identification index in the Operation and Maintenance Manual which includes the tag number, the type of valve, the service and the location.

3.08 IDENTIFICATION TAGS FOR MECHANICAL EQUIPMENT AND DEVICES

A. All mechanical equipment, panels, control devices such as temperature sensors, pressure transmitters, pressure gauges and other devices shall be provided with

an identification tag that indicates the name of the item. The name shall coincide with the Operation and Maintenance Manual and the as-built drawings.

B. The tag shall be plastic nameplate, 1" x 3" minimum size, engraved laminated phenolic, white with black core. The tags shall be fastened to the equipment or device with metal screws or fastened with a brass jack chain if it cannot be mounted with screws.

C. Provide an equipment index in the Operation and Maintenance Manual that includes the tag number, the type of equipment, the service, and the location.

3.09 CLEAN UP AND WORK PRACTICES

A. The Contractor shall keep the job site free of debris, litter, discarded parts, etc. and shall clean all oil drippings during the daily progress of work. The Contractor shall remove all tools, parts and equipment from the service areas upon completion of the work.

B. The Contractor shall exercise caution during the progress of his maintenance and repair work to prevent damage to the ceilings, roofing and other building structure. The Contractor shall restore all damages, caused by his negligence, to its original condition at his own expense.

3.10 INSTRUCTION TO PERSONNEL

A. The Contractor shall furnish the services of competent instructors who will give full instruction to the designated personnel in the adjustment, operation and maintenance, including pertinent safety requirements, of the equipment or system specified. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of man-days (8 hours) of instruction furnished shall be as specified in other sections. When more than 4 man-days of instruction are specified, approximately half of the time shall be used for classroom instruction. All other times shall be used for instruction with the equipment or system. When significant changes or modifications in the equipment or systems are made under the term of the contract, additional

instruction shall be provided to acquaint the operating personnel with the changes or modifications.

END OF SECTION

SECTION 15070 – MECHANICAL SOUND, VIBRATION & SEISMIC CONTROL

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 DESCRIPTION OF WORK

A. This section covers the furnishing, fabrication, delivery and installation of the sound, vibration and seismic control system complete, including but not limited to the following:

1. Spring vibration isolators
2. Seismic protection components
3. Flexible duct connectors

B. Design Criteria:

1. Equipment, ductwork, piping and conduit shall not be installed which makes rigid contact with the structure unless otherwise allowed by this specification.
2. Pipe anchors and supports: Piping supports and anchors shall not interfere with the free operation of vibration isolation systems.
3. Isolation/absorption products: Provide vibration isolators for mechanical and associated piping and ductwork, to minimize transmission of vibrations and structure borne noise to the building structure or spaces or from the building structure to the machinery. Systems, equipment, or parts which vibrate or generate vibration unduly, or which generate or emit undue noise while in operation, shall: (1) be adjusted, repaired, or replaced as appropriate to obtain acceptable levels of vibration or noise; or (2) be supported on, or fitted with, suppression or absorption devices, or other means, which effectively prevent the transmission of vibration or noise beyond the offending item.
4. Resilient wall, ceiling, and floor penetrations: Provide resilient wall and ceiling penetrations for all piping, conduit, ductwork, etc. supported on suspension isolators or spring isolators.

5. Seismic protection criteria: Use a Horizontal Force Factor minimum 60% of the equipment weight considered passing through the equipment center of gravity in any horizontal direction. Unless vibration isolation is required to protect equipment against unacceptable structure transmitted noise or vibration, protect the structure or equipment from earthquakes by rigid structurally sound attachment to the load-supporting structure. Protect each piece of vibration-isolated equipment with protected spring isolators or separate seismic restraint devices. Determine by calculations the number and size of seismic restraints needed for each equipment, duct or pipe. Verify seismic restraint vendor's calculations by a registered professional engineer. Provide seismic snubbers and protected spring isolators rated in three principle axes. Verify ratings by independent laboratory testing.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Division 15 – Mechanical.

B. Section 15000 – General Mechanical Requirements

C. Section 09900 - Painting.

D. Section 15181 – Chilled Water Pipe.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures and Section 15000 –General Mechanical Requirements.

B. Shop Drawings: Submit shop drawings of plans, performance data and details showing locations and installation including, but not limited to, the following: Piping isolation at wall, slab and beam penetrations.

C. Product Data: Submit product data for the following:

1. Isolators
2. Flexible Connectors
3. Flexible duct connectors
4. Pipe guides

D. Spring Isolator Data: For each type and size of spring isolator, submit the spring outside diameter, deflection, operating spring height, unloaded spring height, solid spring height, the ratio of the outside diameter to the operating spring height, the load to deflection ratio of the springs, and weight and sizes of structural steel members.

E. Machinery: For each item of machinery, compare spring static deflections with the specified minimum static deflection, to show that the calculated spring static deflections are not less than the minimum static deflections specified. Rated spring static deflections are not acceptable in lieu of calculated spring static deflections.

F. Instructions:

1. Vibration and noise isolation components

2. Seismic protection components

G. Seismic Protection Rating: Submit in 3 principal axes certified by an independent laboratory or analyzed by an independent licensed structural engineer.

H. Schedules:

1. Schedule of equipment listing name and addresses of manufacturers; manufacturer's local supplier's name, address and phone number; catalog numbers and trade names in accordance with Section 15000 – General Mechanical Requirements.

2. An itemized list showing items to be isolated, the isolator type, model number, isolator loading and deflection, and reference to specific drawing showing frame construction where applicable.

I. As-Built Drawings: Submit drawings in accordance with Section 15000 – General Mechanical Requirements.

J. Guarantee and Certificate: Submit one-year guarantee and certificate in accordance with Section 15000 – General Mechanical Requirements.

1.05 QUALITY ASSURANCE

A. Vibration Isolator Procurement: For each piece of machinery to be isolated from vibration, supply the vibration isolators, and other associated materials and

equipment as a coordinated package by a single manufacturer. Select isolators that provide uniform deflection even when machinery weight is not evenly distributed. This requirement does not include the flexible connectors or the hangers for the associated piping and ductwork.

B. Unitized Machinery Assemblies: Mounting of unitized assemblies directly on vibration isolation springs is acceptable if machinery manufacturer certifies that the end supports of the assemblies have been designed for such installation.

PART 2 - PRODUCTS

2.01 CORROSION PROTECTION FOR STEEL PARTS

A. ASTM A 123/A 123M hot-dipped galvanized, or equivalent manufacturer standard coatings. Where steel parts are exposed to the weather, provide galvanized coating of at least 2 ounces of zinc per square foot of surface. Coat springs with neoprene.

2.02 NEOPRENE

A. ASTM D 471 and ASTM D 2240, Grade Durometer 40, 50, or 60, and oil resistant.

2.03 SPRING ISOLATORS

A. Provide minimum 2-inch deflection, or as indicated, spring isolators, seismic restraint type with vertical stops, that are adjustable and laterally stable with free-standing springs of horizontal stiffness at minimum 80% of the vertical (axial) stiffness. For machine-attached and floor-attached restraining elements, separate from metal-to-metal contact by neoprene cushions 1/8" thick minimum. Provide neoprene acoustic friction pads at least 1/4" thick. For outdoor locations, provide neoprene coated springs and galvanized housings or comparable corrosion resistant coating. Mounting shall be as manufactured by Mason Industries, Inc., M. W. Sausse, Amberbooth, Caldyn or approved equal.

1. Springs: Provide springs with base and compression plates, to keep spring ends parallel during and after deflection to operating height. Provide outside coil diameters at least 0.8 of the operating height. At operating height, springs shall have additional travel to complete (solid) compression equal to at least 50% of the operating deflection. The spring element in the isolator shall either

be set in a neoprene cup and have a steel washer to distribute the load evenly over the neoprene, or each isolator shall be mounted on a unit Double Neoprene Pad isolator. If the Double Neoprene Pad isolator is used, a rectangular bearing plate of appropriate size to load the pad uniformly in the range of 40 to 50 psi shall be provided. If the spring isolator is supplied with a neoprene friction pad, a stainless steel, aluminum, or galvanized steel plate shall be used between the friction pad and the Double Neoprene Pad isolator. The Double Neoprene Pad isolator, steel plate, and friction pad shall be permanently adhered to one another and to the bottom of the bearing plate.

2. Mounting and adjustment: Provide base and compression plates with mounting holes or threaded fittings. Bolt leveling adjustment bolts to machinery or base. If the isolator is to be fastened to the building structure and a Double Neoprene Pad isolator is used under the bearing plate, neoprene grommets shall be provided for each bolthole in the base plate. Boltholes shall be properly sized to allow for grommets.

2.04 FLEXIBLE CONNECTORS FOR PIPING

A. Straight or elbow flexible connectors rated for temperatures, pressures, and fluids to be conveyed. Provide flexible connectors with the strength 4 times operating pressure at highest system operating temperature. Provide elbow flexible connectors with a permanently set angle.

B. Elastomeric Flexible Connectors: Provide flexible EPDM connectors with Kevlar tire cord reinforcement in all water piping connections to air handling units where pipe is greater than 2-inch nominal diameter. Connectors shall be of EPDM, single sphere, with ductile iron Class 150 flanged connections. Flanged assemblies shall be equipped with limit bolt to restrict maximum travel and resist pressure thrusts. Connectors shall have a minimum rating of 250 psi at 170ºF operating temperature. All materials shall be suitable for use in chilled water systems and outdoor environments. Connectors shall be Mason Industries, Inc., Type SFEJ, Mercer Rubber or approved equal.

C. Metal Flexible Connectors: Provide metallic braided hose in all water piping to pumps, air handling units and fan coil units where pipe is 2-inch or less nominal diameter. Provided threaded ends. Lengths shall be 6 times the nominal

diameter with a maximum of 36 inches. Hoses shall be installed on equipment side of shut-off valves and horizontally wherever possible. Fabricated of Grade E phosphor bronze, Monel or corrugated stainless steel tube covered with comparable bronze or stainless steel braid restraining and pressure cover. Provide Mercer BBF, Metraflex or approved equal.

2.05 FLEXIBLE DUCT CONNECTORS

A. Provide flexible duct connectors fabricated in accordance with SMACNA DCS.

2.06 SEISMIC PROTECTION COMPONENTS FOR PIPING AND DUCTWORK

A. Provide in accordance with SMACNA SRM and the National Uniform Seismic Installation Guidelines (NUSIG).

2.07 DOUBLE NEOPRENE PAD

A. Neoprene pad isolators shall be formed by two layers of 1/4" to 5/16" thick ribbed or waffled neoprene, separated by a stainless steel or aluminum plate. These layers shall be permanently adhered together. Neoprene shall be as specified. The pads shall be sized so that they will be loaded within the manufacturer's recommended range. Double neoprene pad isolators shall be formed from products from Mason Industries, Inc., M.W. Sausse or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall obtain inspection from the WHFD AND/OR PROJECT MANAGER of any installation to be covered or enclosed prior to such closure.

B. The Contractor shall obtain and follow written instructions from the vibration isolation manufacturer as to the proper installation and adjustment of vibration isolation devices.

3.02 ISOLATOR INSTALLATION

A. General: The installation or use of vibration isolators must not cause any change of position of equipment, conduit, piping or ducting, which would result in stresses in connections or misalignment of shafts or bearings. In order to meet this objective, equipment and attached systems shall be maintained in a rigid position during installation. The load shall not be transferred to the isolator until

the installation is complete and under full operational load. All plumbing, piping and ducting at mechanical equipment connections is to be fully supported by hangers. Mechanical equipment and vibration mounts shall not carry plumbing, piping or ducting loads.

B. Equipment Isolator Installation: The minimum clearance between the underside of the frame or inertia base and the pad or floor shall be one inch. Space saver brackets shall be used for equipment supported on spring isolators. The frame shall be placed in position and supported temporarily by shims prior to the installation of the machine or isolators. After the entire system installation is completed and under full operational load, the isolators shall be adjusted so that the load is transferred from the shims to the isolators. When all isolators are properly adjusted, the shims will be barely free and shall be removed.

C. Vibration Isolation Components: Install vibration isolation materials and equipment as indicated and in accordance with machinery manufacturer's instructions.

D. Flexible Pipe and Duct Connectors: Install flexible connectors in accordance with the manufacturer's instructions. When liquid pulsation dampening is required, flexible connectors with spherical configuration may be used. Provide restraints for pipe connectors at pumps to prevent connector failure upon pump startup.

3.03 EQUIPMENT ISOLATION

A. Provide vibration isolators and flexible connectors in accordance with manufacturer's recommendations. Machinery with spring isolators or protected spring isolators shall rock or move freely within limits of stops.

B. Stability: Isolators shall be stable during starting and stopping of machinery without traverse and eccentric movement of machinery that would damage or adversely affect the machinery or attachments.

C. Lateral Motion: The installed vibration isolation system for each piece of floor or ceiling mounted machinery shall have a maximum lateral motion under machinery start up and shut down conditions of not more than 1/4". Restrain motions in excess by approved spring mountings.

D. Unbalanced Machinery: Provide foundation suspension systems specifically designed to resist horizontal forces for machinery with large unbalanced horizontal forces. Vibration isolator systems shall conform to the machinery manufacturer's recommendations.

E. Non-rotating Machinery: Mount non-rotating machinery in systems which includes rotating or vibrating machinery on isolators having the same deflection as the hangers and supports for the pipe connected to.

3.04 PIPING ISOLATION

A. General:

1. Provide vibration isolation for piping. The isolator deflections shall be equal to or greater than the static deflection of the vibration isolators provided for the connected machinery.

2. Where lateral support of pipe risers is required, this shall be accomplished by the use of resilient lateral supports.

3. Pipes penetrating the building structure shall be isolated from the structure by the use of resilient penetration sleeve/seals.

4. Drain piping connected to vibration-isolated equipment shall be installed so that it does not contact the building structure or other non-isolated system unless it is resiliently mounted.

5. Piping connected to vibration-isolated equipment shall be installed so that it does not strain or force out of alignment pipe flexes or vibration isolators supporting either the equipment or the piping.

B. Piping Connected to Vibration Isolated Machinery: Provide isolation for piping, 2 inches diameter or greater, for a distance of 25 feet or 50 pipe diameters, whichever is greater.

C. Chilled Water Piping: Provide isolation for risers from pumps and for the first 20 feet of the branch connection of the main supply and return piping at each floor.

D. Water Distribution Piping Application: Resiliently support piping with combination spring and neoprene isolation hangers. Provide spring elements with 5/8" static

deflection; install the hanger with spacing so that the first harmonic natural frequency is not less than 360 Hz. Provide double-deflection neoprene elements. For the first 2 isolation hangers from the rotating equipment of 3 inches and smaller piping systems, ensure a deflection equal to the equipment-isolation static deflection. For the first 4 piping isolation hanger supports from rotating equipment of 4 inch and larger piping systems, use resilient hanger-rod isolators at a fixed elevation regardless of load changes. Incorporate an adjustable preloading device to transfer the load to the spring element within the hanger mounting after the piping system has been filled with water.

3.05 PIPE HANGER AND SUPPORT INSTALLATION

A. Pipe Hangers: Provide eyebolts or swivel joints for pipe hangers to permit pipe thermal or mechanical movement without angular misalignment of hanger vibration isolator.

B. High Temperatures: Where neoprene elements of vibration isolator may be subjected to high pipe temperatures, above 160ºF, provide metal heat shields or thermal isolators.

C. Valves: Provide vibration isolation hangers and supports at modulating, pressure reducing, or control valves that will induce fluid pulsations. When required or indicated, isolate valves with flexible connectors.

D. Machinery Without Flexible Connections: When piping is not connected to vibrating machinery with flexible connectors, provide the first 4 hangers with isolation elements designed for deflections equal to equipment vibration isolator deflections (including static, operating, and start-up).

E. Twelve Inch and Larger Pipe: Suspend 12-inch and larger pipe vibration hangers from resilient hanger rod isolators. Resilient hanger rod isolators shall be capable of supporting pipe during installation at a fixed elevation regardless of load changes. Provide an adjustable preloading device to transfer the load to isolation element after operational load is applied. Provide 12-inch and larger pipe supports with unrestrained stable springs for one-inch deflection and with built-in leveling device and resilient vertical limit stops to prevent spring elongation when partial load is removed. Provide isolators capable of providing rigid anchoring during erection of piping so that it can be erected at a fixed elevation.

F. Pipe Risers: Provide pipe riser supports with bearing plates and two layers of 1/4" thick ribbed or waffled neoprene pad loaded to not more than 50 psi. Separate isolation pads with 1/4" steel plate. Weld pipe riser clamps at anchor points to the pipe and to pairs of vertical acoustical pipe anchor mountings which shall be rigidly fastened to the steel framing.

G. Supports at Base of Pipe Risers: Piping isolation supports at the base of risers shall be two layers of 1/2" thick heavy-duty neoprene pad separated by 1/4" thick steel plate. Use bearing plates sized to provide a pad loading of not more than 500 psi. Weld the stanchion between the pipe and isolation support to the pipe and weld or bolt to the isolation support. Bolt isolation support to the floor slab with resilient sleeves and washers. Where supplementary steel is required to support piping, provide a maximum deflection of 0.08" at the mid-span of this steel under the load. Rigidly support piping from the supplementary steel with the supplementary steel isolated from the building structure with isolators.

H. Pipe Anchors: Attach each end of the pipe anchor to an omni-directional pipe isolator which in turn shall be rigidly fastened to the steel framing or structural concrete. Provide a telescoping pipe isolator of 2 sizes of steel tubing separated by a minimum 1/2" thick pad of heavy-duty neoprene or heavy-duty neoprene and canvas. Provide vertical restraints by similar material to prevent vertical travel in either direction. The load on the isolation material shall not exceed 500 psi.

3.06 SEISMIC RESTRAINT FOR PIPING AND DUCTWORK

A. Provide seismic restraints in accordance with SMACNA SRM and the National Uniform Seismic Installation Guidelines (NUSIG).

3.07 ELECTRICAL CONNECTIONS

A. Provide flexible conduit or multiple conductor cable connections for machinery with sufficient extra length to permit 2-inch minimum displacement in any direction without damage.

3.08 SYSTEMS NOT TO BE VIBRATION ISOLATED

A. Do not provide vibration isolation for electrical raceways and conduits or for fire protection, storm, sanitary, and domestic water piping systems that do not

include pumps or other vibrating, rotating, or pulsating equipment including control and pressure reducing valves.

3.09 FIELD QUALITY CONTROL

A. Provide equipment and apparatus required for performing inspections and tests. Notify WHFD AND/OR PROJECT MANAGER 14 days prior to machinery vibration testing. Rebalance, adjust, or replace machinery with noise or vibration levels in excess of those given in the machinery specifications, or machinery manufacturer's data.

B. Field Inspections: Prior to initial operation, inspect the vibration isolators for conformance to drawings, specifications, and manufacturer's data and instructions. Check for vibration and noise transmission through connections, piping, ductwork, foundations, and walls. Check connector alignment before and after filling of system and during operation. Correct misalignment without damage to connector and in accordance with manufacturer's recommendations.

C. Spring Isolator Inspection: After installation of spring isolators or protected spring isolators, and seismic restraint devices, the machinery shall rock freely on its spring isolators within limits of stops or seismic restraint devices. Eliminate or correct interferences.

D. Tests: Adjust, repair, or replace isolators as required to reduce vibration and noise transmissions to specified levels.

END OF SECTION

SECTION 15080 – MECHANICAL INSULATION

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 WORK DESCRIPTION

A. This section covers the furnishing, fabrication, delivery and installation of the insulation for air conditioning and ventilation, and plumbing systems complete, including, but not limited to, the following:

1. Sheet metal duct insulation.
2. Pipe Insulation.
3. Equipment Insulation.
4. Manufacturer's literature, shop drawings and record drawings.
5. Inspection, test and guarantee.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Mechanical work as specified in Section 15000 – General Mechanical Requirements unless specified otherwise in other sections of Division 15 – Mechanical.

B. Section 15810 – Ductwork & Ductwork Accessories.

C. Section 09900 – Painting.

D. Section 15400 – Plumbing.

E. Section 15181 – Chilled Water Piping.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures and Section 15000 – General Mechanical Requirements.

B. Product Data: Submit product data for the following:

1. Duct insulation.
2. Pipe insulation.

3. Equipment insulation that is not factory installed.

4. Insulation accessories including vapor barrier, tape, jacket and other items.

C. Schedules: Schedule of materials listing name and addresses of manufacturers; manufacturer's local supplier's name, address and phone number; catalog numbers and trade names in accordance with Section 15000 – General Mechanical Requirements.

D. Certificates of Conformance or Compliance: Submit certificates of conformance for performance and characteristics specified, the listed standards and in accordance with Section 15000 – General Mechanical Requirements for the following:

1. Duct insulation.

2. Pipe insulation.

E. Guarantee and Certificate: Submit one-year guarantee and certificate in accordance with Section 15000 – General Mechanical Requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. General:

1. Provide materials complying with NFPA Bulletin 90-A, as determined by UL method NFPA 225-ASTM E 84 or UL 181, with flame spread rating 25 and under and smoke developed rating 50 and under.

2. Where vapor barriers are used, provide intact and continuous throughout.

2.02 DUCT INSULATION

A. Air conditioning ducts and plenums shall be insulated. Ventilation ducts (i.e., outside air and exhaust) in conditioned spaces or in spaces above air-conditioned rooms shall be insulated.

1. Unless otherwise indicated, insulate all interior supply and return ducts with 1 1/2" thick fiberglass, 1.5 lbs per cu ft density, foil faced duct wrap. Provide Owens-Corning Fiberglass commercial grade faced duct wrap insulation Type 150, Schuller, Certainteed or approved equal. Duct wrap insulation shall conform to the requirements of Federal Specification HH-I-558B, Form B,

Type I, Class 6, B-4 and NFPA 90 with the reinforced foil-Kraft vapor barrier facing conforming to Federal Specification HH-I-100B, Type II.

2.03 PIPE INSULATION

A. All above grade indoor hot water and hot water return piping shall be insulated with Johns-Manville Micro-Lok with Vapor Barrier Jacket or approved equal by Owens Corning and Certainteed, having minimum density of 3.5 lbs per cu ft and a maximum "K" factor of .22 BTU at 50ºF mean. Thickness of insulation shall be as follows:

Thickness	Pipe Size
1 inch	Up to 2 inches
1-1/2"	2-1/2" and over

B. The insulation shall be applied over clean, dry pipe with all joints firmly butted together. Longitudinal laps shall be sealed with vapor barrier adhesive. Butt joints shall be wrapped with a 4-inch strip of the vapor barrier jacket cemented with vapor barrier adhesive. Each 3 ft section of insulation and each butt strip shall be additionally secured with 3/4" wide white tape as approved by the insulation manufacturer.

C. Valves shall be insulated with fiberglass insulation with water resistant vapor barrier, similar to adjacent piping. Insulation shall be applied to allow full operational travel of valve handles.

D. Clamps or hangers in contact with pipe shall be insulated separately in the same manner as fitting. The insulation shall be applied upward along the vertical hanger rod to a point not less than 6 inches and sealed off.

E. Protect pipe insulation at all hanger and support points. Where one-inch thick insulation is used, it shall be protected by 12 inches long galvanized metal shield. Where 1-1/2" insulation is used, cellular glass with vapor barrier jacket shall be installed at the hanger point and protected with a 16-gauge galvanized metal shield on the outside of the jacket.

2.04 OTHER MECHANICAL EQUIPMENT REQUIRING INSULATION

A. Pipe hangers and supports for insulated pipes that contact the pipe surface directly shall be insulated with same insulation system as the pipe insulation.

B. Strainers that are connected to insulated pipes. Insulate strainers with 1-1/2" thick cellular glass insulation. Finish insulation with ASJ vapor barrier.

C. Flow devices installed in insulated pipes. Insulate with same insulation system as adjacent pipe insulation. Provide removable insulation covers for test connections (e.g., connections to install portable flow meter) of the same material as the pipe insulation.

D. Parts of air handling equipment that are not factory insulated such as mixing boxes, return air plenums, etc. Insulate with same duct insulation system as connecting ductwork.

E. Equipment, pipes and related appurtenances that are indicated or specified to be insulated but were not factory insulated shall be insulated to match the thickness of the pipe insulation specified herein.

PART 3 - EXECUTION

3.01 COOPERATION WITH OTHER TRADES AND CONFLICT IN WORK

A. Contractor shall examine all drawings of proposed work and coordinate his work with other trades. Work conflicts shall be brought to attention of the WHFD AND/OR PROJECT MANAGER and work rearranged or modified in accordance with his decision.

B. If changes in indicated locations or arrangements of work are required, they shall be made by Contractor without additional charge to the WHFD AND/OR PROJECT MANAGER provided that these changes were ordered before work is installed and no extra material or labor is required.

C. Should Contractor determine that extra material and labor will be required to accommodate any rearrangement, he shall first submit detailed estimate of cost for required changes and proceed with work only upon written authority of the WHFD AND/OR PROJECT MANAGER.

3.02 EQUIPMENT INSTALLATION

A. Equipment shall be installed as indicated and in accordance with manufacturer's recommendations and instructions.

B. All necessary supports shall be provided for equipment, appurtenances and duct as required. This work shall include any additional steel purlins, brackets, seismic restraints or supports.

3.03 WORKMANSHIP AND FABRICATION

A. Ductwork, Plenums, Casings and Accessories Insulation:

1. Provide field-applied insulation to exterior of supply ducts, return ducts, outside air intake ducts, duct plenums, and casings of HVAC units. Ensure full range of motion of equipment actuators. Modify insulation to avoid obstruction with valve handles, damper handles and other such items. Install insulation with jackets drawn tight and cement down on longitudinal and end laps. Do not use scrap pieces where a full-length section will fit.

2. Rigid insulation: Secure rigid insulation by impaling over pins or anchors located not more than 3 inches from joint edges of boards, spaced not more than 12 inches on center and secure with washers and clips. Spot weld anchor pins or attach with a waterproof adhesive especially designed for use on metal surfaces. Apply insulation with joints tightly butted. Neatly bevel insulation around nameplates and access plates and doors. Each pin or anchor shall be capable of supporting a 20 lbs load. Cut off protruding ends of pins, after clips are sealed with coating compound for inside work or manufacturer's recommended weatherproof coating for outside work, and reinforced with open weave glass membrane.

3. Flexible blanket insulation: Apply insulation with joints tightly butted. Secure insulation to ductwork with adhesive in 6-inch wide strips on 12-inch centers. Staple laps of jacket with outward clinching staples on 4-inch centers. Provide pins, washers and clips at 18 inches on center and not more than 4 inches from duct edge for duct surfaces greater than 24 inches across except for top surfaces of horizontal ducts. For vertical ducts with surfaces less than 24 inches across, provide pins no more than 4 inches from duct edge at 18 inches on center. Carry insulation over standing seams and trapeze-type hangers. Install speed washers with pins and pin trimmed to washer. Sagging of flexible duct insulation shall not be permitted. Cut off protruding ends of pins after securing and sealing clips with coating compound for inside work. In cold air ducts, vapor seal joints and staple as

specified.

B. Pipe Insulation:

1. Fiberglass insulation: Apply insulation over clean, dry pipe with all joints firmly butted together. Longitudinal laps shall be sealed with Johns-Manville vapor barrier adhesive. Butt joints shall be wrapped with a 4-inch strip of the vapor barrier jacket cemented with vapor barrier adhesive. Each 3 feet section of insulation and each butt strip shall be additionally secured with 3/4" wide Johns-Manville white tape.

3.04 PAINTING AND IDENTIFYING OF PIPING

A. General: The following items furnished under this section are to be painted under Section 09900 – Painting. Do not paint over nameplates or other identifying labels.

1. Exposed pipe insulation.
2. Exposed duct insulation.
3. Exposed equipment insulation that is unfinished.

3.05 ADJUSTING AND CLEANING

A. Pipes, equipment and ducts shall be cleaned free of scale and thoroughly flushed of all foreign matter prior to field insulation. Equipment shall be wiped clean, with all traces of oil, dust, dirt, or paint spots removed. Pipe hangers and supports that were temporarily loosened to allow installation of the insulation and jacket, shall be repositioned and adjusted to carry the load without crushing the insulation.

END OF SECTION

SECTION 15181 – CHILLED WATER PIPING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 DESCRIPTION OF WORK

A. This section covers the furnishing, fabrication, delivery and installation of the chilled water piping systems complete, including but not limited to the following:

1. Piping and fittings.
2. Valves and accessories.
3. Manufacturer's literature, shop drawings and record drawings.
4. Testing and guarantee.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Division 15 – Mechanical.

B. Section 15000 – General Mechanical Requirements.

C. Section 09900 – Painting.

D. Section 15720 – Air Handling Units.

E. Section 15070 – Mechanical Sound, Vibration, & Seismic Control.

F. Section 15080 – Mechanical Insulation.

G. Section 15950 – HVAC Testing/Adjusting/Balancing.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures and Section 15000 – General Mechanical Requirements.

B. Shop Drawings: Submit shop drawings of plans, performance data and details showing locations and installation including, but not limited to, the following (note: shop drawing of these items can be combined with the shop drawing for the air conditioning equipment shop drawings): Chilled water piping.

C. Product Data: Submit product data for the following: Piping and valves.

D. Schedules: Schedule of equipment listing name and addresses of manufacturers; manufacturer's local supplier's name, address and phone number; catalog numbers and trade names in accordance with Section 15000 – General Mechanical Requirements.

E. Reports: Testing, adjusting and balancing of chilled water systems specified in Section 15950 – HVAC Testing/Adjusting/Balancing.

F. Certificates of Conformance or Compliance:

1. Submit certificates of conformance for performance and characteristics specified, the listed standards and in accordance with Section 15000 – General Mechanical Requirements for the following: Piping and valves.

2. Submit certificates of qualifications for manufacturers' representatives: None.

G. As-Built Drawings: Submit drawings in accordance with Section 15000 – General Mechanical Requirements.

H. Operations and Maintenance Manuals: None.

I. Guarantee and Certificate: Submit one-year guarantee and certificate in accordance with Section 15000 – General Mechanical Requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. The manufacturer must have other piping systems of comparable type and size installed and operating satisfactorily in the State of Hawaii for a minimum of 2 years prior to bid opening.

2.02 PIPING AND FITTINGS

A. General: All pipe and pipe fittings shall be suitable for 125 psi minimum working pressure, in accordance with the latest edition of ASTM and ANSI specifications as indicated.

B. Service: Aboveground chilled water.

Item	Size	Description
Pipe	2" and smaller	Hard drawn copper tubing, Type L, conforming to ASTM B 88.
	2-1/2" and larger	Standard weight, black steel, ASTM A 53, beveled ends. Alternate: Grooved ends, Victaulic or approved equal.
Fittings	2" and smaller	Wrought copper soldered joint type conforming to ANSI B16.18 and soldered joints with 95-5 tin antimony alloy or brazed.
	2-1/2" and larger	Black steel, standard weight, butt-weld type, ASTM A 234, ANSI B16.9. Use standard weight weld rings at joints of piping if required by approved welding procedure. Alternative: Grooved fittings, Victaulic or approved equal.
Unions	2 1/2" and smaller	For copper tubing and shall be cast bronze with soldered ends.
Flanges	2"	Cast bronze, 150-lb soldered joint type flanges, ANSI B16.24.
	2-1/2" and larger	Forged steel, 150-lb weld neck, flat-faced or raised face to match flange on valves or equipment, ASTM A 181, ANSI B16.5. Alternate: Grooved ends, Victaulic or approved equal.

C. Hot Water Reheat piping and fittings: Provide similar types of piping and fittings as chilled water piping.

D. Condensate Drain piping and fittings: Schedule 40, Type PVC with solvent joint DWV fittings. Insulate with 3/4" thick elastomeric pipe insulation, conforming to ASTM C 534, Type 1.

E. Service: Aboveground chilled water: In lieu of welded steel fittings for 2-1/2" and larger pipe sizes, grooved fittings may be used. The Contractor shall submit shop drawings based on the grooved fittings for approval and to meet the original intent of the drawings. All changes to use the grooved system shall be the

Contactor's responsibility and shall be part of the original contract amount. Grooved system shall be Victaulic or approved equal.

2.03 VALVES

Item	Size	Description
Globe Valves	3" and smaller	125-lb S.W.P., bronze body, rising stem, inside screw, composition disc, threaded ends. Provide NIBCO T-211 or approved equal.
Check Valves	1-1/2" and smaller	125-lb S.W.P., bronze body, swing check valve, bronze disc, bronze hinge pin, Buna-N resilient seat, threaded ends. Provide NIBCO T-413 or approved equal.
	2" and larger	125-lb S.W.P., double door check valve, steel or cast-iron body, aluminum bronze doors, stainless steel spring and pins, Buna-N resilient seat, non-slam closure, lug body style. Provide Apco Series 9000-L or approved equal.
Ball Valves	2" and smaller	125-lb S.W.P., bronze body, Type 316 stainless steel ball and stem, PTFE seat, full port, lever handle with integral stop, threaded ends. Provide NIBCO T-585-70-66 or approved equal.
Plug Valves	2-1/2" and smaller	150-lb S.W.P, bronze body, eccentric resilient chloroprene faced plug, lever handle with integral stop, threaded ends. Provide Dezurik Fig. 120 or approved equal.
		3" and larger 125-lb S.W.P., cast iron body, resilient chloroprene faced eccentric plug, flanged ends and manual operator with handwheel actuator and right angle gear drive. Provide DeZurik Fig. 118 or approved equal.

Item	Size	Description
Butterfly Valves	2" and larger	MSS-SP67, Type I tight shutoff valve, ductile iron lug body, stainless steel stem, aluminum bronze disc, EPDM seal, positive latching lever actuator with memory stop. For sizes 4-inch and larger, provide worm gear drive with handwheel. For valves located more than 5 feet above finished floor, provide chain wheel operator and chain. Provide NIBCO LD-2000 or approved equal.

2.04 PIPE HANGERS AND SUPPORT

A. Hangers and supports shall be of manufacturer and type specified or as indicated or approved equal. Pipe supports and hangers in contact with copper piping shall be copper or plastic coated.

B. Shields: Provide protection shields at hanger points of insulated piping. Shields shall be Crawford Fig. 25, Elcen Fig. 219, or Fee and Mason Fig. 81 or Grinnell Fig. 167.

C. Supports:

1. Piping shall be supported from structural steel, grouted CMU walls, or concrete slab only; piping shall not be supported in any manner from the roofing.

2. Drilled-in threaded inserts: Where supports in slabs are required after concrete has been poured, Phillips “Redhead” drilled in threaded inserts shall be provided, installed in accordance with manufacturer's recommendations.

3. Expansion anchors and power-actuated fasteners and devices: Install lead shield anchors or power actuated sleeves, fasteners and devices in accordance with manufacturer's recommendations. Powder actuated pins are not allowed to be “shot” into the concrete structure.

D. Schedules:

1. Pipe support spacing shall conform to the following table, except support spacing for copper tubing shall not exceed 6 feet on centers:

Pipe Size	Support Spacing
1/2" and 3/4"	Not over 6'–6"
1" and 1-1/4"	Not over 8'–6
1-1/2"	Not over 10'–0"
2" and 2 1/2"	Not over 12'–0"
3"	Not over 12'–0"
4"	Not over 14'–0"
6"	Not over 17'–0"
8" to 12"	Not over 21'–0"
14" to 18"	Not over 25'–0"

2. Sizes of pipe hanging suspension rods shall be sized to carry the intended load based on manufacturer's data.

E. Supplementary Steel: Provide all necessary supplementary steel for proper support or attachment of hangers. Steel shall be painted with one coat of rust inhibiting primer.

F. Single Hangers: Unless otherwise indicated, support single pipe runs as follows: Clevis hanger, conforming to MSS SP-69, Type 1, with insulation protection shield.

G. Riser Clamps: Carbon steel conforming to MSS SP-69 Type 8. Grinnell Fig. 261, Fee and Mason Fig. 241.

2.05 STRAINERS

A. Provide wye ("Y") type strainer ahead of all flow control valves and as indicated, bronze body (2-inch and smaller) or cast iron body (2-1/2" and larger) with stainless steel strainer screens with no larger than 0.033" perforations and threaded ends (2-inch and smaller) or flanged ends (2-1/2" and larger). Provide valved flushing line from bottom of each strainer. Provide Nibco T-221-A or F-721-A, or approved equal.

2.06 THERMOMETERS

A. Organic blue liquid filled lens tube type with separable socket. Provide adjustable, 9-inch scale, 0ºF to 100º F range for chilled water application with 2ºF maximum scale divisions, enameled die-cast aluminum adjustable angle case. Provide stainless steel wells for steel pipes and brass wells for copper pipe and of suitable length to accommodate pipe size and thickness of insulation.

2.07 PRESSURE GAUGES

A. Pressure gauges shall be Grade A, accurate within 1% of full scale, phosphor bronze Bourdon tube, spring type, with 4-1/2" diameter dials unless otherwise indicated, with recalibrating screws. Socket shall be 1/4" NPT forged brass, bottom outlet. Gauges shall have plain cast aluminum cases with screwed rings finished in black enamel or chromed and shall be installed with necessary piping, including heavy-duty needle valve.

B. Pressure gauges ranges shall be such that the position of the pointer during normal operation will be 50% of dial range.

2.08 CHILLED WATER AUTOMATIC FLOW CONTROL DEVICES

A. Automatic Flow Control Valves: Provided individually selected and factory calibrated by the flow control valve manufacturer for the service specified. The valves shall automatically limit the rate of flow of the system to the required design capacity regardless of system fluctuations. Valves shall regulate flow within 5% of their tag rating over an operating pressure differential of at least 14 times the minimum required for control. Provide tamper-proof valves with body tappings suitable for connecting instruments for verifying flow control performance. Provide the self-cleaning, cartridge-piston type with stainless steel or Monel, variable area orifices. Valves shall be copper or bronze body and designed for a minimum service pressure of 125 psig. Valve bodies shall have threaded or flanged connections. Furnish each automatic flow control valve with a valve kit located outside of insulation, and hose fittings suitable for use with the measuring instruments as specified. Provide a metal identification tag fastened to each of the flow control valves with a chain. The tag shall include manufacturer's name, model number, rated flowrate in gallons per minute, and operating pressure differential range. Provide a portable meter with a direct reading gauge, hoses, shutoff valves, vent valves, “psi” to “gpm” conversion chart, and carrying case that is compatible with the flow control valves provided. Portable flow meter shall be turned over to the WHFD AND/OR PROJECT MANAGER at the end of the project. Provide Griswold Controls, copper sweat type or threaded flange type with dual hose meter KVT #3429A, Autoflow or approved equal.

B. Manual Flow Control Valve: Copper alloy body up to 2-inch size, Y-pattern ductile iron body for 2-1/2" and larger sizes, 300 psi working pressure, differential

pressure read out ports across valve seat, memory stop, calibrated nameplate, threaded or grooved end, leak tight full rated working pressure and portable meter and hoses to read flowrate or differential pressure and flowrate calibration curve. Victaulic TA Hydronic Circuit Balancing Valve or approved equal.

2.09 CONTROL VALVES

A. 2-Way Motor Actuated Control Valves: Provide direct acting for use with chilled water service, modulating control. The valves shall be rated for 150 lbs and be designed for maximum pressure drop of 8 psi but not less than 2 psi unless the flow coefficient (Cv) is specified. Direction of flow shall be indicated on the body. Provide bodies, stems, and plugs of a material that will not corrode or pit when used in the water systems. Provide 2-way modulating type valve with bronze body with threaded ends, reinforced TFE seat and stuffing box ring, bronze bushing, insulation around the bracket, stainless steel stem. Provide electric motor designed for use as valve actuator and with sufficient torque for shutoff duty at system pressure. Actuator shall respond to proportional electronic or digital signal from the temperature control system and designed for modulating or on-off service as indicated. Provide control transformer and linkages as required 120 volts or less, slow closing (minimum 60 seconds from fully open to fully closed position), manual override button and mechanism.

PART 3 - EXECUTION

3.01 COOPERATION WITH OTHER TRADES AND CONFLICT IN WORK

A. Contractor shall examine all drawings of proposed work and coordinate his work with other trades. Work conflicts shall be brought to attention of WHFD AND/OR PROJECT MANAGER and work rearranged or modified in accordance with his decision.

B. If changes in indicated locations or arrangements of work are required, they shall be made by Contractor without additional charge to the WHFD AND/OR PROJECT MANAGER provided that these changes were ordered before work is installed and no extra material or labor are required.

C. Should Contractor determine that extra material and labor will be required to accommodate any rearrangement, he shall first submit detailed estimate of cost

for required changes and proceed with work only upon written authority of the WHFD AND/OR PROJECT MANAGER.

3.02 EQUIPMENT INSTALLATION

A. Equipment shall be installed as indicated and in accordance with manufacturer's recommendation and instructions.

B. All necessary supports shall be provided for equipment, appurtenances and pipe as required. This work shall include any additional steel purlins, brackets, seismic restraints or supports.

C. Provide controls as indicated for proper operation of the equipment. Provide all necessary relays, contactors, enclosures and transformers to ensure proper system operation.

3.03 WORKMANSHIP AND FABRICATION

A. Pipe Installation:

1. Pipe shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, properly clearing all windows, doors and other openings. Cutting or weakening of the building structure to facilitate piping installation will not be permitted.

2. Pipes shall be cut square, shall have burrs removed by reaming, and shall be so installed as to permit free expansion and contraction without damage to joints or hangers. Install special swing and expansion joints in pipe lines where required to accommodate specified movement. Filings, dust, or dirt shall be wiped from interior of the pipe before connections are made.

3. Changes in direction shall be made with fittings. All piping shall be installed with sufficient pitch to insure adequate drainage.

4. Screw joints shall be made with tapered threads properly cut conforming to requirements of NBS handbook H28. Joints shall be made perfectly tight with a stiff mixture of litharge and glycerin or other approved threaded joint compound applied with a brush to the male threads only. Not more than three threads shall show after the joint is made up.

5. Welded joints shall conform as to workmanship, testing, qualification of welders and general requirements, with welding section of ANSI B31.9. The

WHFD AND/OR PROJECT MANAGER reserves the right to require qualifying demonstration of any welder assigned to job by Contractor at no additional cost.

6. Flanges shall be suitable for the required operating pressures and temperature conditions. Gaskets shall be fiber plastic or synthetic material suitable for water service. All nuts, bolts and washers used shall be galvanized for ferrous flanges and brass for copper or bronze flanges.

7. Pipes passing through walls or concrete floors shall be provided with pipe sleeves fitted into place at time of construction. Sleeves shall not be installed in structural members. Each sleeve shall extend through its respective wall or floor and shall be cut flush with each surface. Unless otherwise indicated, sleeves shall be of such size as to provide a minimum of 1/4" all around clearance between jacket over insulation and sleeves. Space between sleeve and piping shall be packed with twisted jute packing and then sealed with waterproof sealant. Where pipes pass through fire rated walls or floors, seal both ends of sleeve with Underwriter's Laboratories listed thermal barrier material to maintain fire rating.

3.04 PIPE HANGERS AND SUPPORTS

A. Provide adjustable hangers, clamps, supplementary steel, etc., as required for proper support of all piping.

B. Supports shall secure pipes or conduits in place, shall prevent pipe vibration, maintain required grading by proper adjustment, provide for expansion and contraction, and shall make neat appearance.

C. Design supports of strength and rigidity to suit loading, service, and in a manner which will not stress unduly the building construction.

D. Where support is from concrete construction, take care not to weaken concrete or penetrate waterproofing.

E. Provide seismic restraints for all above ground piping to meet the requirements of the IBC as adopted by the Hawaii County.

3.05 EQUIPMENT SUPPORT

A. Refer to drawings for type of construction from which equipment is to be supported. Structural metal supports shall be provided as indicated.

3.06 PAINTING AND IDENTIFYING OF PIPING

A. General:

1. The following items furnished under this section are to be painted and identified under Section 09900 – Painting. Do not paint over nameplates or other identifying labels.

   a. Insulated piping.

2. Paint exposed black iron work including structural steel members used for equipment, pipe, and other supports, iron body valves, pipe hangers, etc., with 2 coats of zinc rich paint.

B. Identification of Piping: Provide identification of all new pipe lines in accordance with the requirements of Section 15000 – General Mechanical Requirements

C. Identification of Valves: Provide valve I.D. tags for all valves shown on the drawings in accordance with the requirements of Section 15000 – General Mechanical Requirements.

D. Identification of Equipment and Devices: Provide equipment identification tags for all equipment and devices shown on the drawings in accordance with the requirements of Section 15000 – General Mechanical Requirements.

3.07 CLEANING AND FLUSHING PIPES

A. Pipes shall be cleaned free of scale and thoroughly flushed of all foreign matter. Provide vents and drains connections and nipples as required to allow flushing the pipes thoroughly.

3.08 TESTING, ADJUSTING AND BALANCING

A. Notify the WHFD AND/OR PROJECT MANAGER 14 days before flushing and testing to allow scheduling to observe the flushing and testing activities.

B. After satisfactory completion of testing, all openings to the piping shall be protected from entrance of foreign objects, dirt, etc. and accelerated corrosion of the interior of the piping.

C. Test, adjust and balance each piece of equipment as required to assure proper operation. See Section 15950 – HVAC Testing/Adjusting/Balancing for further requirements.

3.09 CALIBRATION AND ADJUSTMENTS

A. After completion of the installation, perform final calibrations and adjustments of the equipment provided under this contract and supply services incidental to the proper performance of the unit control panels under warranty.

3.10 ACCEPTANCE PROCEDURE

A. Upon completion of the calibration, Contractor shall perform all necessary testing and run diagnostic tests to ensure proper operation. Contractor shall be responsible for generating all software and entering all database information necessary to perform the sequence of control and specified software routines. An acceptance test in the presence of the WHFD AND/OR PROJECT MANAGER shall be performed.

B. Provide operational acceptance tests. The tests shall be performed during a normal day of operation after the air conditioning system has been completely installed and made operable. Results of the tests shall be indicated on the Operational Performance Test form attached and shall be part of the submittal for the testing and balancing report.

END OF SECTION

SECTION 15300 – WET PIPE FIRE SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The work includes modification of an existing automatic wet pipe sprinkler system to afford 100% complete fire protection coverage throughout the indicated areas. The design, equipment, materials, installation, and workmanship of the sprinkler system shall be in strict accordance with the required and advisory provisions of NFPA 13, except as modified herein.

B. The sprinkler system shall include all materials, accessories, and equipment necessary to provide a system complete and ready for use. Design and installation of the system shall be with full consideration to blind spaces, piping, electrical equipment, ductwork, and all other construction and equipment to afford complete coverage. Devices and equipment for fire protection service shall be listed by the Underwriters' Laboratories, Inc. (UL) or approved by FM Approvals (FM). In the National Fire Protection Association (NFPA) publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word “shall” had been substituted for “should” wherever it appears; reference to the “authority having jurisdiction” shall be interpreted to mean the Building Department and Fire Department. Reference to the “Building Department” on the contract drawings and herein shall be interpreted to mean the County of Hawaii Public Works Building Division; reference to the “Fire Department” shall be interpreted to mean the Hawaii County Fire Department. “Provide” shall mean “furnish and install” when used herein. The work shall begin at the points indicated.

1.02 RELATED SECTIONS

A. Section 07841 – Penetration Firestopping.

B. Section 09900 – Painting.

1.03 CODES, STANDARDS, AND REGULATIONS

A. The latest publications listed below form a part of this specification. The publications are referred to in the text by the basic designation only.

B. Installation of all work in this section shall be made in accordance with State Department of Health Regulations, the National Fire Protection Association, the International Building Code, and the Uniform Fire Code.

C. All applicable codes, regulations and ordinances of public bodies having jurisdiction are considered a part of these specifications. All work installed and materials provided must comply with the current edition of such codes, regulations, and ordinances.

D. ASTM International, A 53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM International, A 135 – Electric-Resistance-Welded Steel Pipe.

F. ASTM International, A 795 – Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.

G. FM Approvals, FM Approval Guide, Updated online.

H. National Fire Protection Association, NFPA 1, Fire Code, 2006 Edition.

I. National Fire Protection Association, NFPA 13, Installation of Sprinkler Systems, 2013 Edition.

J. State of Hawaii Department of Accounting and General Services, Public Works Division, Design Consultant Criteria Manual, Updated online.

K. Underwriters Laboratories, Inc, UL Fire Protection Equipment Directory, Updated online.

L. Underwriters Laboratories, Inc, UL Fire Resistance Directory, Updated online.

1.04 CONTRACT DRAWINGS

A. Contract drawings are essentially diagrammatic, indicating general layout and approximate locations toward establishing the scope for a uniform estimating basis for all bidders. They are not intended to be detailed construction working drawings.

B. Piping arrangements shall fit into space allotted. Reasonable modifications to indicated locations and arrangement to suit job conditions shall not constitute basis for requesting additional funds from the Owner.

C. Verification of Dimensions: The Contractor shall be responsible for the coordination and proper relation of his or her work to the structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself or herself with all details of the work and notify the WHFD AND/OR PROJECT MANAGER of any discrepancy before performing any work.

1.05 SUBMITTALS

A. Manufacturer's Published Data:

1. As soon as practicable and before installation of any materials or equipment is begun, the Contractor shall submit a complete list of materials and equipment together with names and addresses of manufacturers, catalog numbers, and trade names to the WHFD AND/OR PROJECT MANAGER for approval.

2. Annotate descriptive data to show the specific model, type, and size of each item the Contractor proposes to furnish.

3. Approval of materials will be based on manufacturer's published rating. Any materials and equipment that are not in accordance with these specifications may be rejected.

B. Shop Drawings:

1. Provide a soft copy set or two (2) hard copy sets of the shop drawings showing the fire sprinkler systems to be installed by the Contractor. Prepare shop drawings on sheets 24 inches by 36 inches using a drawing scale not less than 1/8" = 1'-0". Shop drawings shall be prepared in accordance with NFPA 13 and include all data essential to the proper installation of the system. Do not commence work until the design of the systems and the various components have been approved.

2. Prior to start of any construction, required copies of to-scale shop drawings of fire sprinkler piping, sprinkler heads, sprinkler valves, shall be submitted for review. No work shall be started without approval of the WHFD AND/OR PROJECT MANAGER. Shop drawings shall be fully dimensioned to show that the equipment and connections thereto fit within the space provided.

3. Review of shop drawings is confined to arrangement of equipment only and

does not relieve the Contractor from responsibility for proper fit, performance, and construction. Any deviation from the contract drawings and/or specifications shall be clearly noted on the shop drawings. Since manufacturing methods vary, reasonable variations from the Contract Documents are acceptable; however, performance and material requirements are a minimum and the WHFD AND/OR PROJECT MANAGER retains the right to judge the equality of any variation.

4. Record Drawings: Upon completion of work, submit accurate as-built shop drawings to the WHFD AND/OR PROJECT MANAGER. As-built shop drawings shall be stamped by a professional engineer registered in the State of Hawaii. Show exact locations and sizes, as actually installed, of the fire sprinkler systems on these record “as-built” drawings.

C. Calculations:

1. For the areas indicated on the Contract Drawings, submit required copies of calculations, together with shop drawings and manufacturer’s published data, for review prior to start of construction.

2. Sway Bracing Calculations: Provide seismic bracing calculations for aboveground piping per NFPA 13. Seismic coefficient value and spectral response is indicated on Contract Drawing bracing details. Seismic bracing shall be installed on all new and existing fire sprinkler mains, where required, in accordance with NFPA 13.

1.06 OMISSIONS

A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions, the Contractor shall call the attention of the WHFD AND/OR PROJECT MANAGER to such omissions 15 days in advance of the date of bid opening so that the necessary corrections can be made.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Furnish new equipment, materials and accessories bearing the manufacturer's identification. Coordinate deliveries to avoid interference or construction delays. Protect products during delivery, storage, installation and the remainder of the contract period after installation.

B. Pipe and fittings shall be stored on pallets or blocks a minimum 2 inches above the ground to prevent foreign material from entering piping prior to installation. Pipe ends shall be capped to prevent dirt, water, or other residue from entering.

1.08 GUARANTEE AND CERTIFICATE

A. Contractor and Installer shall guarantee and certify in writing all work in this section for a period of one year. Contractor shall be responsible for all damages to any part of premises during equipment installation work under this section.

B. The entire fire protection installation described hereinafter shall be guaranteed as a complete working unit for a period of one year. In the event of failure due to faulty workmanship or materials during this period, all said failures shall be corrected to the satisfaction of the WHFD AND/OR PROJECT MANAGER at no additional cost to the Tenant for labor and material.

C. The one-year guarantee shall start at the end of 30 consecutive days of trouble-free operation after acceptance by the Owner.

D. The above guarantee shall not be interpreted as voiding, limiting, or reducing any equipment manufacturer's warranty or any guarantee permitted by law.

PART 2 - PRODUCTS

2.01 MATERIAL AND EQUIPMENT

A. Asbestos-containing materials or equipment shall not be used under this section. The Contractor shall insure that all materials and equipment incorporated in the project are asbestos-free.

B. All materials shall be new, of equal or better quality of materials specified. For ease of maintenance and parts replacement, select equipment from a single manufacturer as much as possible.

C. All devices and equipment for fire protection service shall be UL listed or FM approved.

2.02 DESIGN OF SPRINKLER SYSTEM

A. Hazard Classification shall be in accordance with NFPA 13 and as indicated on contract drawings.

B. Location and spacing of sprinklers shall be in accordance with NFPA 13. Sprinklers shall be spaced uniformly on branch lines.

C. Provide components to provide availability for testing and maintenance of the overhead wet pipe automatic sprinkler system, in accordance with NFPA 13.

D. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the WHFD AND/OR PROJECT MANAGER.

E. Sprinkler spacing and pipe sizes shall follow existing piping. Contractor shall submit hydraulic calculations if greater sprinkler spacing or smaller pipe sizes are installed.

2.03 MATERIAL AND EQUIPMENT

A. Provide automatic closed head sprinklers as indicated on contract drawings. New sprinkler shall not be equipped with O-ring seals. Sprinklers shall be UL listed or FM approved.

B. Provide a metal cabinet with spare sprinkler heads, 3 sprinkler stoppers, and one sprinkler head wrench near the fire sprinkler riser or as indicated by Kona Community Hospital maintenance. The quantity and types of spare sprinkler heads shall be provided as specified in NFPA 13. Label spare cabinet with location(s) fire sprinklers are installed.

C. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the WHFD AND/OR PROJECT MANAGER.

2.04 ABOVEGROUND PIPING SYSTEM

A. Sprinkler System Piping and Fittings: Steel Piping and Fittings: Provide steel piping for fire sprinkler piping in accordance with NFPA 13. Pipe sizes less than 2 1/2" in diameter shall be Schedule 40. Pipe sizes 2 1/2" and larger shall be Schedule 10 or 40. Plastic piping shall not be permitted. Fittings shall be welded, threaded, or grooved-end type, UL listed or FM approved for use in sprinkler systems. Fittings for pipe sizes 2 inches in diameter and smaller shall be threaded. Make changes in pipe sizes through standard tapered reducing pipe fittings. Use of bushings will not be permitted. Press-fit fittings, snap-fit

fittings, and plain-end fittings that utilize steel gripping devices to bite into pipe when pressure is applied will not be permitted. Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape or pipe cement; apply only on male threads. Welding shall be performed in the shop; field welding will not be permitted.

B. Pipe Hangers: Provide hangers, supports, inserts, earthquake sway bracing, branch line restraint, and associated items to properly support fire sprinkler system piping in accordance with pertinent provisions of NFPA 13. Listed fasteners shall be used to secure hanger, earthquake sway bracing, and restraint assemblies to wooden building structural members, such as beams, trusses, and purlins. Provide retaining straps for all beam clamps to metal building structural members. Provide additional hangers to support the concentrated loads in piping between hangers, such as for flanged valves.

C. Sway Bracing and Branch Line Restraints: Provide on new and existing piping within area of work in accordance with NFPA 13. Provide branch line restraint for armovers that require hangers.

D. Drain Piping: Provide auxiliary drains as required by NFPA 13.

E. Pipe Penetrations: For penetrations through non-fire rated walls, firmly pack space with insulation and caulk at both ends of sleeve with a flexible, waterproof cement. For penetrations through fire rated walls, floor/ceiling, or roof assemblies, provide approved UL listed through-penetration fire stop system. Provide UL fire stop assembly information on wall near fire stop penetration. Penetrations shall be sized to provide clearance in accordance with NFPA 13.

F. Escutcheon Plates: Provide approved one piece or split hinge type plates for piping passing through floors, walls, and ceilings in both exposed and concealed areas. Provide chromium plated metal plates where pipe passes through finished ceilings. Provide other plates of steel or cast iron with aluminum paint finish. Securely anchor plates in place with set screws or other approved positive means.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of work. Do not proceed until unsatisfactory conditions are corrected.

3.02 SPRINKLER SYSTEM IMPAIRMENT

A. The Contractor shall impair only sections of the sprinkler system where work is involved and the remainder of the system shall be kept in service. Prior to impairing the water supply to the existing sprinkler system, the Contractor shall comply with all provisions of Chapter 16, NFPA 1 and notify the Building Manager to receive instructions on any additional fire safety precautions that must be observed during the sprinkler system impairment. The Contractor is responsible for following these precautions during the entire impairment. When the system is restored to normal working order, the Contractor shall verify that all control valves are fully open. The maximum duration of sprinkler system impairment for areas impacted by this work shall be 8 hours or as directed by the Building Manager or Fire Department.

3.03 INSTALLATION

A. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this section.

B. Install the work of this section in strict accordance with the approved shop drawings and the requirements of the Fire Department, Building Department, and applicable governmental agencies.

C. Equipment, material, installation, and workmanship shall be in accordance with NFPA 13 except as modified herein. Install piping straight and true to bear evenly on hangers. Keep the interior of new piping and existing piping affected by the Contractor's operations thoroughly clean of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping and

fittings so that water and foreign matter will not enter the pipes or fittings. Inspect piping before placing into position. Piping shall be inspected, tested, and approved before covering or concealing. Seal both ends of penetrations through fire rated walls, floor/ceiling assemblies, and roof assemblies to maintain fire resistive integrity with UL listed through-penetration fire stop assembly. Sprinkler piping shall be supported from the building structure; sprinkler piping shall not be supported from sprinkler piping. Piping shall be inspected, tested, and approved before covering or concealing.

D. Contractor shall center sprinkler heads in ceiling tiles as indicated on contract drawings.

E. Provide sway bracing branch line restraint on new and existing piping in accordance with NFPA 13.

F. Welding, Soldering, and Brazing: Prior to welding, soldering, or brazing of copper tube, the Contractor shall comply with all provisions of Chapter 41, 2006 NFPA 1 as amended by the Hawaii County and notify the Building Manager to receive instructions on any additional fire safety precautions which must be observed during all hot work operations. All welded outlets shall be examined and accepted by the WHFD AND/OR PROJECT MANAGER prior to installation. The Contractor is responsible for following these precautions at all times.

G. Fire sprinkler piping shall not be routed directly over electrical equipment, panel boxes, controls, switches, and other energized electrical devices, per Fire Protection Design Criteria, 2.5.1.

3.04 FIELD TESTING OF FIRE SPRINKLER SYSTEMS

A. Preliminary Testing and Inspections: Field testing and inspections shall be witnessed by the WHFD AND/OR PROJECT MANAGER. Testing shall be performed in accordance with NFPA 13 and this specification. Contractor shall furnish appliances, equipment, instruments, connecting devices, two-way radios, and personnel for tests. Contractor shall pay for all fire sprinkler tests and inspections. Fire Sprinkler Contractor shall be present for all testing and inspections.

1. Perform in-service leak testing for new and existing piping in the area of work as indicated on contract drawings. Piping above suspended ceilings shall be

tested before installation of ceilings. Furnish test report to the WHFD AND/OR PROJECT MANAGER.

2. Perform visual observation of fire sprinkler and piping installation to verify compliance with the contract documents and NFPA 13. Schedule observation walkthrough before piping is concealed.

3. When tests have been completed and corrections made, submit signed and dated certificates, similar to those specified in NFPA 13 with a request for formal inspection and tests.

B. Formal Inspection and Tests: The General Contractor shall submit the request for formal inspection at least 15 days prior to the date the formal inspection is to take place. Experienced technicians regularly employed by the fire sprinkler contractor shall be present for the entire duration of the inspection. At this inspection, the installing contractor shall repeat any or all of the required tests as directed. Correct defects in the work provided by the installing contractors and perform additional tests until it has been demonstrated that systems comply with all contract requirements. Contractor shall furnish appliances, equipment, instruments, connecting devices, 2 way radios, and personnel for tests.

END OF SECTION

SECTION 15400 – PLUMBING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 DESCRIPTION OF WORK

A. Provide complete interior water, plumbing and sanitary sewer systems. “Provide” shall mean “furnish and install” when used herein. Connect to utility systems at the 5 feet building line and as shown on drawings.

B. Connect to the plumbing system, all fixtures and equipment, which may be furnished by the Architect under another section of these specifications.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Section 07841 – Penetration Firestopping.

B. Section 09900 – Painting.

C. Section 15000 – General Mechanical Requirements.

D. Section 15080 – Mechanical Insulation.

E. Division 16 – Electrical.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittals and Section 15000 – General Mechanical Requirements:

B. Drawings: At minimum, plan view and isometric piping diagrams of plumbing system piping and equipment including connection points to the site utilities. Inverts of buried piping shall be shown on the shop drawings.

C. Product Data:

1. Spare parts.
2. Plumbing fixtures.
3. Pipe and fittings.
4. Valves.

5. Specialties.

6. Piping identification.

7. Valve identification.

D. Schedule: Maintenance Service Contract.

E. Certificates of Conformance or Compliance:

1. Chlorination test results.

2. Plumbing inspection completed.

F. As-Built Drawings: Submit as-built drawings for the plumbing system that conform to the general requirements in Section 15000 – General Mechanical Requirements.

G. Operations and Maintenance Manuals: Plumbing Fixtures

H. Guarantee and Certificate: Submit one-year guarantee for all plumbing work in accordance with the general requirements in Section 15000 – General Mechanical Requirements.

1.05 QUALITY ASSURANCE

A. Obtain and pay for all fees, permits, licenses, assessments, connection charges and inspections required for this work.

B. Accessible fixtures, other than those specified herein, require pre-bid approval to ensure compliance with the Commission on Persons with Disabilities of the State of Hawaii. No substitutions will be considered after the bid opening. Equal products are acceptable in lieu of those specified hereinafter by specific manufacturer and model number.

1. Valves: Nibco, Crane, Walworth, Dezurik, or Stockham.

2. Fixtures and equipment: Kohler.

3. Drainage system specialties: Josam, Zurn or Smith.

4. Flush valves: Sloan or Delany.

5. Pipe supports: Elcen, Tolco, Grinnell, Fee and Mason or Unistrut.

6. Stainless steel sinks: Elkay, Just, or Moen.

7. Fixture trim: American Standard, Delta, Symmons, Sloan, Chicago, Elkay,

Kohler or T&S.

C. Comply with the recommendations and requirements of the codes and standards listed hereinafter in addition to detailed requirements of this specification. In the event of conflicting requirements, this specification shall prevail.

1. American Society for Testing and Materials (ASTM) Publications:

A 53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
A 74	Cast Iron Soil Pipe and Fittings
A 616	Standard Specification for Rail Steel Deformed and Plain Bars for Concrete Reinforcement
B 88	Standard Specification for Seamless Copper Water Tube
B 306	Copper Drainage Tube (DWV)
C 564	Rubber Gaskets for Cast Iron Soil Pipe and Fittings
C 150	Standard Specification for Portland Cement
D 1785	Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120
D 2661	Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste and Vent Pipe
D 2665	Poly Vinyl Chloride (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
D 2466	Poly Vinyl Chloride (PVC) Plastic Pipe Fittings (Schedule 40)
D 2467	Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
D 2564	Solvent Cements For Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
D 4101 F 656	Propylene Plastic Injection and Extrusion Materials Primers For Use In Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
F 1412	Polyolefin Pipe and Fittings For Corrosive Waste Drainage Systems

2. American National Standards Institute (ANSI) Publications:

B16.18	Cast Copper Alloy Solder-Joint Pressure Fittings
B16.22	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
B16.23	Cast Copper Alloy Solder Joint Drainage Fittings DWV
B16.26	Cast Copper Alloy Fittings for Flared Copper Tubes
B31.9	Building Services Piping. (Same as ASME B31.9-96)
C2	National Electrical Safety Code

3. Cast Iron Soil Pipe Institute (CISPI) Publications:

301	Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications
310	Coupling For Use In Connection With Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications
Pamphlet 100	Installation Suggestion for “No-Hub” Pipe and Fittings

4. Plumbing and Drainage Institute (PDI) Standards:

WH-201	Water Hammer Arrester Standard

PART 2 - PRODUCTS

2.01 MATERIALS

A. See general requirements for materials and equipment in Section 15000 – General Mechanical Requirements.

2.02 PLUMBING FIXTURES

A. Accessible fixtures, other than those specified herein, require pre-bid approval to ensure compliance with the Commission on Persons with Disabilities of the State of Hawaii. Provide chrome plated brass one quarter turn angle stops, chrome plated brass tube risers, chrome plated brass P-traps, trap arms, adapters,

escutcheons and cover plates. Provide connecting fittings, china bolt caps, wall support brackets as required. Provide flow restrictors or other approved flow control devices to limit flow for all lavatory faucets to maximum 1.5 gpm and showers and sink faucets to a maximum of 2.0 gpm. Urinals shall be limited to maximum 0.5 gallons per flush. Toilets shall be limited to maximum 1.28 gallons per flush. All strainers shall be provided with holes not larger than 1/4" diameter. Wall mounted fixtures shall include floor mounted wall carriers for that fixture. Wall carriers included in the following specifications are for single fixtures. For back-to-back fixture conditions, provide carriers to accommodate each fixture's rough-in requirements and revise model numbers in accordance with the manufacturer's recommendations.

B. Accessible Water Closet - Floor Mounted - Flush Valve Style - A-WC:

1. Floor mounted, elongated bowl, flush valve, 4 bolt base, vitreous china, white, 16-1/8-inch-17-1/2-inch high. Provide Kohler "Highcliff Ultra" No. K-96057 or approved equal. Total height from finish floor to top of seat shall not be less than 17-inch, nor higher than 19-inch.

2. Sloan ECOS 111-1.28, Delany or approved equal flush valve, 1.28 gallons per flush, 1-1/2-inch exposed top spud, hardwired, chrome plated, 1-inch screwdriver angle stop, adjustable tailpiece, integral vacuum breaker, spud coupling, wall and spud flanges, infrared sensor with adjustment screw, and override button.

3. Provide Olsonite No. 95, Church No. 9500C, Kohler No. K-4666C or approved equal 1-inch thick maximum, heavy duty solid white plastic open front seat with check hinge.

C. Accessible Lavatory - Wall Hung – Cold Water - A-LAV:

1. 20-1/2-inch by 18-1/4-inch nominal overall dimensions, single hole, vitreous china, front overflow, faucet ledge, contoured back and side splash shields, white. Provide Kohler "Kingston" No. K-2005 or approved equal. Depth of lavatory bowl shall not exceed 6-1/2 inches. Provide soap dispenser hole.

2. Provide Smith No. 700, Josam No. 17100 or approved equal floor mounted concealed arm wall carrier.

3. Provide Sloan sensor faucet SF-2400 or approved equal. 0.5 gpm laminar

flow control insert, hardwired sensor type. Provide chrome plated brass basket strainer, chrome plated drain fittings, 1-1/2-inch tailpiece and trap. Provide chrome plated angle supplies with loose key stops. Force to activate faucet shall be less than 5 lbs. Provide solid tube connection between supply stop and faucet. Flex hoses shall not be provided.

4. Provide Plumberex Handy-Shield, Truebro or approved equal closed cell foam or vinyl insulated safety covers for supplies and drain, including the trap.

D. Sink - Single Compartment – SK:

1. Single compartment, 18-gauge, stainless steel, undermount, 23-1/2 inch by 18-1/4 inch overall dimensions, 21-inch by 15-3/4-inch by 9-inch deep bowl dimensions. Underside of sink shall be fully undercoated. Provide Elkay No. SPUH-2115, or approved equal. Provide chrome plated stainless steel covers for all unused faucet holes.

2. Provide Chicago 201 or approved equal dual lever faucet with swing 5-1/4 inch gooseneck spout, 2.5 gpm laminar flow control insert, 4” wrist blade handles, cartridge type. Provide chrome plated brass basket strainer, chrome plated drain fittings, 1-1/2-inch tailpiece and trap. Provide chrome plated angle supplies with loose key stops. Force to activate faucet shall be less than 5 lbs. Provide solid tube connection between supply stop and faucet.

2.03 PIPE AND FITTINGS

A. Drainage, Waste and Vent Piping Below Grade: Service weight cast-iron soil pipe and fittings, conforming to ASTM A 74, “Standard Specification for Cast Iron Soil Pipe and Fittings,” no-hub cast iron soil pipe conforming to CISPI 301, “Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications,” with cast iron mechanical couplings, stainless steel bolts and nuts, and neoprene gaskets or heavy duty stainless bands with 4 or more adjusting screws. Provide MG coupling, Husky Series 4000 Anaheim Foundry Company or approved equal.

B. Drain, Waste and Vent Piping Above Grade: Service weight cast-iron soil pipe and fittings, conforming to ASTM A 74, “Standard Specification for Cast Iron Soil Pipe and Fittings,” no-hub cast iron soil pipe conforming to CISPI 301, “Standard

Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications," with stainless steel bands and neoprene gaskets.

C. Potable Water Piping: Type "L" hard-drawn copper tube, conforming to ASTM B 88, "Standard Specification for Seamless Copper Water Tube," with soldered (95-5) joint wrought copper pressure fittings conforming to ANSI 16.22. Use long radius elbows wherever possible. Use Type "K" hard-drawn copper tube with brazing alloy on joints and pipes below grade.

D. Pipe Sleeves: Schedule 40 steel pipe, ASTM A 53.

2.04 VALVES

A. Ball Valves 3 Inches and Smaller: 600 psi W.O.G., bronze, 2-piece body, 316 stainless steel ball, reinforced TFE seat and seals, full port, threaded ends, 316 stainless steel stem, lever handle with integral stop. Provide NIBCO T-585-66-LF, Watts LFB6080G2 or approved equal.

2.05 PLUMBING SYSTEM SPECIALTIES

A. Cleanouts:

1. Cleanout – CO: Provide Smith No. 4470, Josam or approved equal, bronze countersunk plug.

2. Floor cleanout – FCO: Provide Smith No. 4105, Josam or approved equal cast iron cleanout with round heavy duty scoriated nickel-bronze top, ABS plug and flashing flange.

3. Wall cleanout – WCO: Provide Smith No. 4472, Josam or approved equal with polished stainless-steel access plate and screw.

B. P-Traps Installed Below Floor: Deep-seal cast-iron p-trap.

C. Water Hammer Arresters: Provide Smith Series 5000, Josam or approved equal. Provide on water supplies and locate as close as practical to each faucet, control valve or flush valve except hose faucets. Air chambers shall consist of a 12-inch length of pipe of the same diameter as the branch supply, capped on one end. Commercial type arresters, tested and certified in accordance with PDI WH-201, "Water Hammer Arresters," shall be provided where indicated. Installation of these arresters shall be accessible and include access panels when concealed.

Size of the arresters shall conform to the PDI symbols and shall be selected in accordance with the recommendations of PDI:

PDI Symbol	Fixture Unit Rating
A	1-11
B	12-32
C	33-60
D	61-113

D. Access Panels – AP: Provide Milcor, Karp or approved equal access doors with Allen wrench lock and concealed hinges; style K for plaster walls, style A for acoustical tile surfaces, style M for masonry and other surfaces. 8" x 8" minimum size in walls and partitions for single items (e.g., WHA), 12" x 12" for more than one item (e.g., 2 adjacent valves) and either 12" x 12" or 24" x 24" for ceiling access and as indicated. For access panels in fire rated walls and ceilings, provide fire rated access panels to match or exceed the rating of the wall or ceiling. Unless otherwise noted, provide access panels with primer painted surfaces and field painted to match the color of the adjacent surface.

E. Floor Drain - FD: Provide Smith No. 2005-A, Josam or approved equal with Duco cast iron body and flashing collar, 5-inch round nickel-bronze strainer with round, 1/4 inch by 1/4 inch square heelproof openings, vandal proof screws and No-Hub outlet. Provide trap primer connections as indicated.

PART 3 - EXECUTION

3.01 PREPARATION

A. Determine the exact route of each pipe and check for interferences with the building structure, foundation, electrical work and other work in the area. Make offsets and changes in direction required to maintain proper head room and pitch or to accommodate the structure and the work of other trades. Furnish other trades with information to properly locate and size openings in the structure required for this work. Furnish anchor bolts, sleeves, inserts and supports required for this work. Coordinate and schedule plumbing work with Contractor to allow construction to proceed without delays. Install rough-in piping for fixtures, equipment and specialties according to the schedule when the structure is ready (e.g., hose bibbs located in CMU walls before walls are grouted).

3.02 INSTALLATION AND REQUIREMENTS

A. Provide guard or insulation around high-temperature equipment and materials to protect personnel. When exposed to weather, provide a weather-protected enclosure around electrical equipment, controls and other items that are not satisfactorily protected. All required demolition including saw cutting and chipping of concrete and masonry to remove or install fixtures and piping shall be provided as well as patching, repair and painting at no additional cost to the WHFD AND/OR PROJECT MANAGER.

3.03 CUTTING AND PATCHING

A. Cut all holes necessary for installation of work under this section.

B. Patching of all holes, etc., will be done under other sections of specification. Patch any holes cut unnecessarily.

3.04 ACCESS TO EQUIPMENT

A. Install all control devices, specialties, valves and related items to provide easy access for operation, inspection, repair and maintenance. If these items are concealed behind walls or ceilings of non-removable type construction, provide access panels of proper size for easy access at no additional cost to the WHFD AND/OR PROJECT MANAGER.

3.05 FIXTURE INSTALLATION

A. Set fixtures in an approved workmanlike manner. Point up all edges against building structure with white grout. Provide adequate wall carriers or supports for all wall-mounted fixtures. Provide water supplies for all fixtures; Brasscraft or equivalent, compression joint type with chromium plated brass escutcheon and cover tube, loose-key angle stop valve and drawn copper tube riser even if details are not shown on the plans. Provide chromium plated brass P-trap, waste fittings, wax rings, gaskets, fasteners and escutcheon as required for all fixtures even if not detailed on the drawings. Exposed metal including pipe shall be polished chromium plated. Provide a 1/4" x 6" x 32" steel plate for support of wall-hung lavatories if carriers are not specified. Secure plate to studs and bolt to fixtures. Point-of-connections indicated are suggested locations. Contractor may, at his option, relocate the point-of-connection (POC) to a more convenient location if the existing piping is deemed to be inaccessible. All extra piping,

fittings and valves for relocated POC's shall be provided at no additional cost to the WHFD AND/OR PROJECT MANAGER. Sinks with multiple compartments and trough sinks, provide multiple faucets, angle supplies and stops to match the number of faucet locations specified or indicated at no additional cost to the WHFD AND/OR PROJECT MANAGER.

3.06 PIPING INSTALLATION

A. Conform to the requirements of the current Uniform Plumbing Code as adopted by the Hawaii County. Inspect all pipe inside and outside. Remove interior obstructions and ream out pipe ends. Tool markings on polished fittings are not acceptable. Cut pipe accurately so that it can be worked into place without springing or forcing. Install pipes parallel to the wall of the structure and plumb. Make changes in direction with fittings. Bushings are not permitted. Install valves with stems above horizontal. Provide proper support and adequate provisions for expansion, contraction, slope and anchorage. Provide dielectric unions where copper tubing connects to steel pipe. Wrap pipe or tubing with 1/4" thick felt, secure with tape, where it contacts other materials. Have piping tested, inspected and approved before it is furred in, buried or otherwise hidden. Provide standard weight galvanized steel pipe sleeves where pipes pass through structure, sufficiently large to provide 1/4" minimum clearance around pipe. Caulk watertight around pipes passing through sleeves. Wrap pipe with polyethylene tape where it passes through sleeve and when it contacts concrete or masonry. Grout with fireproof material around all pipe penetrations through slabs and walls full length of penetrations. Where pipes pass through firewalls or floors, seal both ends of sleeve with Underwriters Laboratories listed thermal barrier material to maintain fire rating. Provide chrome-plated brass escutcheons, set tight on the pipe and to the wall where pipes are exposed in finished areas. Provide clamping collar or membrane flange where pipe or drains penetrate waterproof membrane. Perform all welding using qualified welders in accordance with American National Standards Institute's Code B31.9 and American Welding Society Standard B3.0. Insulate piping specified in accordance with the manufacturer's recommendations.

3.07 PIPING SYSTEM SUPPORTS

A. Pipe Supports: For above ground piping, see details on drawings. Support copper pipe at maximum spacing of 4 feet for pipes 1-1/2" and smaller, 7 feet for pipes 2-inch through 4-inch.

B. Pipe Hangers: Steel clevis hanger with adjustable hanger rod; 3/8" for pipe 2 inch and smaller. 2-inch for pipe 2-1/2" through 3-1/2" and 5/8" for pipe 4 inch and larger. For copper pipes, provide copper hangers, plastic coated steel or other commonly used protective surfaces to prevent contact of dissimilar materials used for the piping and hangers. Groups of lines shall be supported as detailed on drawings. Provide trapeze type hangers for groups of pipes routed at the same elevation. Hanger rods shall not be supported from other pipe and conduit hangers or supports unless specifically designed for this application.

C. Supplemental Steel: Provide supplemental structural steel piping supports as required to support piping from structure. Supplemental structural and supporting steel shall be hot-dipped after fabrication and, if exposed, painted with a final coat to match adjacent area.

3.08 DRAINAGE, WASTE AND VENT PIPE SYSTEMS

A. Coordinate point of connection locations and material compatibility with the site utilities contractor's work and schedule. Slope drain lines at 1/4" per foot unless otherwise indicated. Install hub cast-iron pipe in accordance with CISPI & Fittings Handbook 1990. Install no-hub cast-iron pipe in accordance with CISPI pamphlet 301. Provide cast-iron and neoprene gasketed hub coupling below grade. Above grade MG stainless steel clamps and cast-iron no-hub couplings shall be installed in accordance with manufacturer's written instructions. On roof vents and where other drains occur above the ground floor, provide clamping device with drain. Provide a 4 lbs. lead flashing sheet extending 8 inches out around drain body for flat roof areas and secure with clamp device or factory fabricated flashing with rubber gasket designed for sheet metal roofs. Coordinate point of connections, locations and materials, with site utilities.

3.09 WATER PIPING SYSTEM

A. Coordinate point of connection locations and material compatibility with the site utilities contractor's work and schedule. Secure each water line where it

penetrates partitions to serve fixtures, and similar items. Wrap all lines passing through concrete with polyethylene tape. Install unions or flanges at all valves, equipment and system specialties. Install dielectric unions at connections of copper and ferrous pipes. Coordinate point of connections, locations and materials, with site utilities.

3.10 DIELECTRIC CONNECTIONS

A. Copper pipe shall be insulated from direct contact with ferrous piping connections by approved insulating (dielectric) unions or couplings or flanges.

3.11 FIELD QUALITY CONTROL

A. Test plumbing systems in accordance with the Uniform Plumbing Code. Perform tests in the presence of, and to the satisfaction of inspectors having jurisdiction over the work. Ask for final inspection by the WHFD AND/OR PROJECT MANAGER after all tests, adjustments and balancing have been performed.

1. Test drainage systems in accordance with Section 712 of the Plumbing Code.

2. Hydrostatically test the domestic water piping system at 100 psi. Inspect the entire system while under pressure and correct all deficiencies.

3. Test equipment to demonstrate its operations and compliance with the specification.

B. All drainage piping systems, which show signs of obstructed flow, no flow or slow flow shall be thoroughly snaked until all obstructions are cleared and water drains freely.

3.12 TESTING AND INSPECTION

A. Contractor shall furnish all equipment for tests and any required retests and pay for all cost of repairing any damage resulting from such tests. Contractor shall repair and adjust systems until they are approved. Tests shall be performed in presence of, and to satisfaction of, inspector of official agency involved.

B. Defective Work: If inspection or test shows defects, such defective work or material shall be replaced and inspection and tests repeated. Repairs to piping shall be made with new material. No caulking of screwed joints or holes will be accepted.

C. Protection of Fixtures, Materials, and Equipment: Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical injury. Upon completion of all work, fixtures, materials, and equipment shall be thoroughly cleaned, repainted as required, adjusted, and operated.

D. Removal and capping of existing plumbing lines as required is included in this section to isolate existing pipes.

E. Chlorination: Domestic water lines shall be sterilized with chlorine before acceptance of work. Sterilize water system for 24 hours with 100 ppm chlorine introduced into the lines in an approved manner. Operate all valves during contact period. Flush system until chlorine is less than 0.2 ppm. All valves in lines being sterilized shall be opened and closed several times during contact period. Certificate shall be furnished to WHFD AND/OR PROJECT MANAGER evidencing proper performance of sterilization.

3.13 ADJUST AND CLEAN

A. Clean up work areas and fixtures: Adjust system for proper operation, ready for use. Touch up with matching paint all damaged factory finishes. Provide valve tags, and a list, which includes the type of valve tag, size, location, and area served. Clean diaphragms for the flush valves per the manufacturer's recommendations. Bleed all air from lines.

3.14 PAINTING AND IDENTIFYING OF PIPING

A. General:

1. All non-factory finished (i.e., finish painted) items furnished under this section are to be painted including exposed piping, insulation and fittings. See Section 09900 – Painting. Do not paint over nameplates or other identifying labels.

2. Paint exposed black iron work including pipe, fittings, iron body valves, pipe hangers, etc., with 2 coats of zinc rich paint and finish coat to match adjacent surfaces.

B. Identification of Piping: Provide piping identification for all above ground plumbing system piping in accordance with the requirements of Section 15000 – General Mechanical Requirements.

C. Identification of Valves: Provide valve tags for all plumbing system valves in accordance with the requirements of Section 15000 – General Mechanical Requirements.

D. Identification of Equipment: Provide equipment tags in accordance with the requirements of Section 15000 – General Mechanical Requirements. Plumbing fixtures and underground equipment do not require equipment tags.

3.15 ONE YEAR MAINTENANCE SERVICE CONTRACT

A. Provide maintenance service for all plumbing system components as specified in and in accordance with the requirements and schedule of Section 15000 – General Mechanical Requirements.

3.16 OPERATIONS AND MAINTENANCE MANUAL

A. Shall be provided as specified in Section 15000 – General Mechanical Requirements.

END OF SECTION

SECTION 15405 – MEDICAL GAS SYSTEMS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 WORK DESCRIPTION

A. This section covers the furnishing, fabrication, delivery and installation of the medical gas system complete, including, but not limited to, the following:

1. Medical gas piping and fittings.
2. Valves and valve boxes.
3. Wall outlets.
4. Alarm systems.
5. Operation and maintenance instructions and manuals.
6. Manufacturer's literature, shop drawings and record drawings.
7. Inspection, test, certification and guarantee.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Section 00900 – Painting.

B. Section 15000 – General Mechanical Requirements.

C. Division 16 – Electrical.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures and Section 15000 – General Mechanical Requirements.

B. Shop Drawings: At minimum, plan view and isometric piping diagrams of medical gas system piping and equipment including connection points to the site utilities.

C. Product Data:

1. Medical gas piping and fittings.
2. Valves and valve boxes.

3. Wall outlets.

D. Certificates of Conformance or Compliance:

1. Medical gas system installer ASSE 6010 qualifications.

2. Medical gas testing and certification completed.

E. As-Built Drawings: Submit as-built drawings for the plumbing system that conform to the general requirements in Section 15000 – General Mechanical Requirements.

F. Operation and Maintenance Manuals: Medical gas equipment.

G. Guarantee and Certificate. Submit one-year guarantee for all plumbing work in accordance with the general requirements in Section 15000 – General Mechanical Requirements.

1.05 QUALITY ASSURANCE

A. Obtain and pay for all fees, permits, licenses, assessments, connection charges and inspections required for this work.

B. Comply with the recommendations and requirements of the codes and standards listed hereinafter in addition to detailed requirements of this specification. In the event of conflicting requirements, this specification shall prevail.

1. American National Standards Institute (ANSI) Publications:

ANSI/AWS A 5.8	Specification for Filler Metals for Brazing and Braze Welding

2. American Society of Mechanical Engineers (ASTM):

ASME B 1.20.1	Pipe Threads, General Purpose, Inch
ASME B 16.22	Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
ASME B 16.50	Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings

3. American Society of Sanitary Engineering (ASSE):

ASSE 6010	Professional Qualification Standard for Medical Gas Systems Installers

4. American Society for Testing and Materials (ASTM) Publications:

ASTM B 819	Standard Specification for Seamless Copper Tube for Medical Gas Systems

5. National Fire Protection Association (NFPA):

NFPA 55	Compressed Gases and Cryogenic Fluids Code
NFPA 99	Health Care Facilities

C. Installation of all work in the section shall be made in accordance with State Department of Health Regulations, National Fire Protection Association, and the Uniform Plumbing Code. Medical gas system components and installation shall conform to NFPA 99 – Health Care Facilities.

D. All applicable codes, regulations and ordinances of public bodies having jurisdiction are considered a part of these specifications; all work installed and materials provided must comply with the current edition of such codes, regulations and ordinances.

PART 2 - PRODUCTS

2.01 MATERIALS

A. See general requirements for materials and equipment in Section 15000 – General Mechanical Requirements.

2.02 PIPE AND FITTINGS

A. Oxygen, Medical Air, Nitrous Oxide, Medical Vacuum and Waste Anesthetic Gas Disposal (WAGD or EVAC) Piping: Hard drawn, seamless copper tube, Type “L”, ASTM B 819 with brazed joints, wrought copper pressure fittings, ASTM B 16.22. Positive pressure medical gas piping shall be cleaned for oxygen service.

2.03 VALVES / CABINET ASSEMBLIES

A. Zone Valves/Cabinets: Zone valve cabinet assemblies shall conform to NFPA 99. Valves shall be 3-piece, bronze-bodied, one-quarter turn ball type capable of being disassembled in line for servicing the O-ring and seating surface. Valves shall include full port chrome plated ball, brass stem and shall have Teflon seat with adjustable packing gland with Teflon stem seal. Valves shall include factory-installed copper tubing extensions to prevent valve seat damage during brazing and capped gauge port. Provide pressure or vacuum gauges for use with valves.

The valves shall be suitable for cold non-shock gas working pressure of not less than 400 psi or full vacuum of 29-inch Hg. Valves shall be cleaned for oxygen service. Valves shall be installed in painted steel wall cabinets and shall have color-coded service indication on valves and valve handles. Cabinets shall be identified by means of engraved plastic nameplates. Cabinets shall be stackable for multi- valve arrangement and shall have an adjustable frame. Cabinets shall have easily removable cover window with pull ring. Provide Amico or approved equal.

B. Service/In-Line Shutoff valves with lockable handles: Valves shall be 3-piece, bronze-bodied, one-quarter turn ball type capable of being disassembled in line for servicing the O-ring and seating surface. Valves shall include full port chrome plated ball, brass stem and shall have Teflon seat with adjustable packing gland with Teflon stem seal. Provide factory-installed copper tubing extensions to prevent valve seat damage during brazing. The valves shall be suitable for cold non-shock gas working pressure of not less than 400 psi or full vacuum of 29-inch Hg. Valves shall be cleaned for oxygen service. Valves shall be installed in accordance with NFPA 99 in restricted areas as indicated, have provisions to lock or latch the handle in the open position, and shall be identified with the name or symbol of the specific medical gas or vacuum, the room or area served, and a caution not to close or open the valve except in emergency. Provide Amico or approved equal.

2.04 MEDICAL GAS OUTLET STATIONS

A. Wall Outlets: Recessed wall outlets stations shall be modular, quick disconnect type and shall conform to NFPA 99 and be U.L. listed. Station outlets shall be equipped with non-interchangeable quick disconnect coupler. Outlet station shall have a chromed or stainless-steel faceplate. The cover plate assembly shall contain indexing pins for safety keying the gas specific cover plate to the appropriate rough-in box, and color-coded gas service identification. The primary valve shall be threaded into the rough-in box separately from the cover plate to facilitate leak testing around the valve. Primary valve poppet shall be self-sealing. The primary valve body shall be made of brass and shall have an adjustable valve mechanism to compensate for variation in plaster thickness. Rough-in box shall be zinc plated, sheet steel with provision for gang installation. Rough-in box shall include a base and tube assembly of Type K copper, brass block,

secondary check valve (except for vacuum), and primary valve O-ring seal. Inlet tube shall be capable of rotating 360 degrees. Secondary check valve shall be fully automatic and self-sealing upon removal of the primary valve. Primary valve seal shall be replaceable without shutting off gas supply to the station. Outlets shall be cleaned for oxygen service. Assembly shall be capped and internal parts bagged for shipment. Provide slide brackets for supporting common secondary equipment and accessories such as flowmeters, suction regulators and half gallon collection bottles. Provide Chemetron only.

PART 3 - EXECUTION

3.01 PREPARATION

A. Determine the exact route of each pipe and check for interferences with the building structure, foundation, electrical work and other work in the area. Make offsets and changes in direction required to maintain proper headroom and pitch or to accommodate the structure and the work of other trades. Furnish other trades with information to properly locate and size openings in the structure required for this work. Furnish anchor bolts, sleeves, inserts and supports required for this work. Coordinate and schedule medical gas work with Contractor to allow construction to proceed without delays. Install rough-in piping for fixtures, and equipment according to the schedule when the structure is ready.

3.02 INSTALLATION REQUIREMENTS

A. Medical gas system installers shall meet the requirements of ASSE 6010, Professional Qualification Standard for Medical Gas System Installers. Provide competent supervision. Furnish new equipment, fixtures, materials and accessories bearing the manufacturer's identification and conforming to recognized commercial standards. All required demolition including saw cutting, coring and chipping of concrete and masonry to remove or install fixtures and piping shall be provided as well as patching, repair and painting at no additional cost to the WHFD AND/OR PROJECT MANAGER. Contractor shall ensure reinforcement for concrete is not damaged during saw cutting or coring of existing walls or slab. Any damage shall be repaired at no additional cost to the WHFD AND/OR PROJECT MANAGER. Provide all extra materials and labor for

a complete operable system at no extra cost to the WHFD AND/OR PROJECT MANAGER.

3.03 MEDICAL-SURGICAL VACUUM SYSTEMS

A. Medical-surgical vacuum piping shall be cleaned, installed, and tested as specified in NFPA 99 for Category 1 piped vacuum systems.

3.04 POSITIVE PRESSURE MEDICAL GAS SYSTEMS

A. Positive pressure medical gas piping shall be cleaned, installed, and tested as specified in NFPA 99 for Category 1 piped gas systems.

3.05 JOINTS

A. Installation of pipe and fittings shall be in accordance with NFPA 99. Mitering of joints for elbows and notching of straight runs of pipe for tees will not be permitted. Joints shall be made up with fittings of compatible material and made for the specific purpose intended.

1. Threaded: Threaded joints shall have American Standard taper pipe threads conforming to ANSI B1.20.1. Pipe threads shall be made up by applying polytetrafluoroethylene tape or other thread sealant suitable for oxygen service on male threads only. Threaded joints are limited to connection of pressure/vacuum gauges, alarm devices, gas-specific demand check fittings and source equipment where allowed by NFPA 99.

2. Straight threaded connections including unions: Unions shall not be permitted in the distribution piping system for piped gas systems.

3. Flared and compression type fittings: Flared and compression type fittings shall not be permitted in the distribution piping system for piped gas systems.

4. Push-fit fittings: Push-fit fittings shall not be permitted in the distribution piping system for piped gas systems.

5. Brazed: Joints in copper tube shall be brazed using wrought copper capillary fittings conforming to ASME B16.22 or ASME B16.50. Cast fittings shall not be used for brazed joints. Joints shall be made with silver brazing alloy or a similar high melting point alloy of not lower than 1000ºF. Brazing filler materials shall comply with ANSI/AWS A5.8. Flux shall not be used except where copper is joined to bronze or brass as permitted by NFPA 99. An oil

free, dry nitrogen gas purge shall be provided to prevent oxide formation inside the copper tubing when joints are silver brazed.

3.06 PIPING SYSTEM SUPPORTS

A. Pipe Supports: For above ground piping, strap to permanent structure or support with pipe hangers unless indicated otherwise. Maximum support spacing for copper pipe shall be as follows:

1/4" nominal	5 ft
1/2" nominal	6 ft
3/4" nominal	7 ft
1" nominal	8 ft
1-1/4" nominal	9 ft
1-1/2" nominal and larger	10 ft

B. Pipe Hangers: Steel clevis hanger with adjustable hanger rod; 3/8" for pipe 2 inches and smaller, 1/2" for pipe 2-1/2" through 3-1/2", and 5/8" for pipe 4 inches and larger. Groups of lines shall be supported as detailed on drawings. Provide insulating tape between copper piping and steel hangers.

C. Trapeze Hangers: Support multiple pipe runs on Unistrut or Empco trapeze type hangers with galvanized finish. Provide insulating tape between copper piping and steel hangers.

3.07 BRANCH TAKE-OFFS

A. Runouts from horizontal piping shall be taken off above the centerline of the main or branch pipe in accordance with NFPA 99.

3.08 IDENTIFICATION OF PIPING

A. Identify all piping by stenciling or using tapes with pressure sensitive adhesives with the name, color code and if at non-standard operating pressure, the pressure of the gas contained. Direction of flow arrows is to be included on each label or tape. Location for pipe labels or tapes shall be as follows:

1. At intervals of not more than 20 feet.
2. At least once in or above every room.
3. On both sides of walls or partitions penetrated by the piping.
4. At least once in every story height traversed by risers.

3.09 IDENTIFICATION OF VALVES

A. Identify all valves by stenciling or using tapes with pressure sensitive adhesives on metal tags. Valves tags shall be labeled with the name of the gas controlled, the room or area controlled by the valve, and a caution statement, “Do not close the valve except in an emergency”. When valves are installed in systems with non-standard operating pressures, the valve identification shall also include the non-standard pressure.

3.10 TESTING AND CERTIFICATION

A. Medical Gas and Vacuum Piping: Medical gas and vacuum piping systems shall be cleaned, pressure tested, cross-connection tested, purged, and final tested in accordance with NFPA 99. After completion of work, an independent party technically competent and experienced in testing of medical gas piping systems shall accomplish certification testing of competed system in accordance with NFPA 99.

3.11 DEFECTIVE WORK

A. If inspection or test shows defects such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated. Repairs to piping shall be made with new materials.

3.12 ADJUST AND CLEAN

A. Clean up work areas and fixtures.

3.13 TRAINING

A. Instruct the Owner in the proper operation and maintenance of the systems. Review the maintenance manuals with the Owner. Submit a list of manufacturer's warranties for the equipment furnished.

END OF SECTION

SECTION 15720 – AIR HANDLING UNITS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 DESCRIPTION OF WORK

A. This section covers the furnishing, fabrication, delivery and installation of the air conditioning and ventilation system complete, including, but not limited to, the following:

1. Air handling units.
2. UVC emitters.
3. Variable frequency drive.
4. Operation and maintenance instructions and manuals.
5. Manufacturer's literature, shop drawings and record drawings.
6. Inspection, test and guarantee.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Division 15 – Mechanical.

B. Section 15000 – General Mechanical Requirements'

C. Section 09900 – Painting.

D. Division 16 – Electrical.

E. Section 15181 – Chilled Water Piping.

F. Section 15810 – Ductwork & Ductwork Accessories.

G. Section 15910 – Direct Digital Control Systems.

H. Section 15950 – HVAC Testing/Adjusting/Balancing.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 15000 – General Mechanical Requirements.

B. Shop Drawings: Submit shop drawings of plans, performance data and details showing locations and installation including, but not limited to, the following (Note: The shop drawing of the following items can be combined with the shop drawing for the ductwork shop drawings in Section 15810 – Ductwork & Ductwork Accessories):

1. Air handling units
2. UVC emitters

C. Product Data: Submit product data for the following:

1. Air handling units
2. UVC emitters
3. Variable frequency drives and starters

D. Schedules:

1. Schedule of equipment listing name and addresses of manufacturers; manufacturer's local supplier's name, address and phone number; catalog numbers and trade names in accordance with Section 15000 – General Mechanical Requirements.
2. Maintenance service contract and schedule.

E. Reports: Testing, adjusting and balancing of air and chilled water systems specified in Section 15950 – HVAC Testing/Adjusting/Balancing.

F. Certificates of Conformance or Compliance:

1. Submit certificates of conformance for performance and characteristics specified, the listed standards and in accordance with Section 15000 – General Mechanical Requirements for the following:
    a. Air handling units and fan coil units per ARI Standards 430, 440 and 410.
    b. Variable frequency drives.
2. Submit certificates of qualifications for manufacturers' representatives: None.

G. As-Built Drawings: Submit drawings in accordance with Section 15000 – General Mechanical Requirements.

H. Operations and Maintenance Manuals: Submit manuals in accordance with Section 15000 – General Mechanical Requirements.

I. Guarantee and Certificate: Submit one-year guarantee and certificate in accordance with Section 15000 - General Mechanical Requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Air conditioning and ventilation equipment to be considered for bid purposes shall be from a manufacturer that has locally stocked spare parts, representation, and support of a factory authorized service organization within 500 miles of the site of installation and has serviced manufacturer's units of comparable type, size and capacity as those specified herein. The manufacturer must have other units of comparable type, size and capacity installed and operating satisfactorily in the State of Hawaii for a minimum of 2 years prior to bid opening.

2.02 FAN COIL UNITS

A. Casing: Chassis shall be galvanized steel construction, designed to mount concealed above finished ceiling. Cold surfaces are covered externally with insulating material. Factory installed condensate drain pan shall be double sloped, removable, cleanable, stainless steel with anti-corrosion coating, and externally insulated. Provide hanger brackets to support the unit weigh on four corners.

B. Fan Assembly: Blower style fan shall be belt-drive, statically and dynamically balances with permanently lubricated and sealed ball bearings. The fan/motor assembly is mounted on vibration attenuating rubber grommets. Fan speed is controlled through variable frequency drive.

C. Air Filter: Mixed air is filtered with a replaceable 4-inch thick, pleated media, MERV-13 filter. Provide mixing box and slide-in filter rack section.

D. Evaporator Coil: Coil shall be nonferrous construction with copper tubes and aluminum fins. Coil shall be factory pressure tested.

2.03 ULTRAVIOLET-C EMITTERS

A. Provide ultraviolet-C (UV-C) emitters listed for use in HVAC applications and damp locations. Component assembly shall consist of stainless-steel housing, power source, emitter sockets, emitter and reflector as applicable. Provide emitters with 115 VAC power source. UV-C lights shall be installed as indicated and shall be sized for coil face area. UV-C lights for AHU shall mount inside module casing. Provide required mounting brackets. Provide interlock with AHU with on-off switch mounted on unit casing. Provide warning sign to read, "DANGER – UV LIGHT INSIDE. TURN OFF BEFORE OPENING OR SERVICING UNIT". Provide Steril-Aire, Sanuvox or approved equal.

2.04 VARIABLE FREQUENCY DRIVE

A. Variable frequency drive (VFD) shall consist of solid-state adjustable frequency controller (AFC) and performance-matched energy efficient motor matched by the controller manufacturer and matched to the requirements of the specified pumps. Provide all accessories for a completely operational system to meet the requirements and sequence of operation specified herein. Provide Reliance VTAC 7 Drive, XE motor, bypass contactor complete with cabinet and accessories specified unless otherwise noted, Magnetek, Graham, Danfoss, Yasakawa or approved equal.

B. The Adjustable Frequency Controller (AFC) shall be a fully digital Pulse Width Modulator (PWM) using very large-scale integration techniques as well as surface-mount technology for increased reliability. The AFC shall use a 16-bit micro-processor with a 12-bit resolution to allow stepless motor control from 1% to 110% of maximum motor base speed.

1. All programmable settings shall be held in non-volatile memory and shall not be affected by power outages, brownouts, power dips, etc. The AFC shall have initial programmable settings intact from the factory without the need for battery backup. The AFC shall not need to be programmed at the job site prior to running the motor but shall be ready to run a motor as soon as power connections are made.

2. Programming at the job site to accommodate specific local application requirements such as frequency avoidance and preset speeds shall be available to the user. Complete motor and drive package efficiency versus

load and speed shall be submitted prior to purchase and coordinated with the requirements of the pumps.

3. All high voltage components within the enclosure shall be isolated with steel or polycarbonate covers.
4. The AFC and options shall be UL listed and CSA certified. The AFC and options shall comply with the applicable requirements of the latest standards of ANSI, IEEE and the National Electric Code.
5. The AFC shall be functionally tested under motor load and then cycled. This assures that if the AFC is started up according to the instruction manual provided, the unit will run reliable.
6. The AFC shall have the following features:
    a. Remote start-stop.
    b. Speed selection.
    c. Timed acceleration and deceleration.
    d. Current limit and voltage limit.
    e. 6-60 Hz controlled speed range.
7. The AFC shall include the following features:
    a. Operators control shall be mounted on the door of the wall mounted steel cabinet and consist of a membrane command center which allows manual stop/start, speed control, local/remote status indication, manual or automatic speed control selection, run/jog selection and forward reverse selection. In addition, the command center will serve as a means to configure controller parameters such as minimum speed, maximum speed, acceleration and deceleration times, volts/hertz ratio, torque boost, slip compensation, over frequency limit, frequency agreement, current limit, and job frequency. Potentiometers will not be allowed for these settings. The controller shall have an internal means of deactivating keypad parameter adjustments to eliminate unauthorized data entry. A slip compensation circuit for accurate 1% speed regulation without the need of a tachometer.
    b. Adjustable D-C braking that is programmable from the command center

adjustable in both amplitude and duration.

c. An electronic overload circuit designed to protect an A-C motor operated by the AFC output from extended overload operation on an inverse time basis.

d. Automatic and manual torque boosts that are adjustable within the control to accelerate hard-to-start applications.

e. An LED display mounted on the door of the cabinet that digitally indicates:

   i. Frequency output

   ii. Voltage output

   iii. Current output

   iv. First fault indication

f. The capability of starting into a rotating load without the need of a time delay upon a start command.

g. Relay contacts for remote indication of drive fault and motor running for interwiring to another device.

h. An automatic restart circuit which is adjustable by number of restart attempts and the interval between restarts.

i. Three critical frequency avoidance bands, which can be programmed in the field, enable the controller to avoid resonate frequencies of the driven equipment. Each critical frequency avoidance band shall have a band width adjustable via keypad entry of up to 10 Hertz.

j. Three programmable preset speeds which will force the AFC to preset speed upon a user contact closure. This feature shall be set digitally by entering data via the door mounted membrane command center.

k. The AFC shall have the capability to ride through power dips up to 500 msec without a controller trip depending on load and operating conditions.

l. Multiple volts/hertz patterns adjustable in one hertz increments from 30 hertz to maximum hertz for maximum flexibility and control.

m. Jog speed selection.

n. Two frequency agreement speeds adjustable in the field and interconnected to on-board dry relay contacts.

o. An isolated electrical following capability and control interface shall enable the AFC to follow a 0-20 Ma, 4-20 Ma, 0-4 volt, 0-8 volt, or 0-10 volt DC grounded or ungrounded speed signal from an external source. In addition, the drive shall be able to follow a pulse train speed signal input.

p. For smooth acceleration and deceleration capabilities, the drive shall have a pre-programmed ramp curve which can be activated locally.

q. Two auxiliary selectable contacts (DPDT) which can be activated by 2 of the following with the actual setpoint adjustable:

i. Zero speed.

ii. Reverse rotation.

iii. Output current.

iv. Output speed.

v. Run.

vi. Line dip in excess of 15 msec.

8. The AFC shall include the following protective circuits and features:

a. Instantaneous electronic trip for the following faults:

i. Motor current exceeds 150% for longer than one minute of controller maximum sine wave current rating.

ii. Output phase-to-phase short circuit condition.

iii. Total ground fault under any operating condition.

iv. High input line voltage.

v. Low input line voltage.

vi. Loss of input phase.

vii. External fault. (This protective circuit shall permit wiring of remote normally close safety contact to shut down the drive.)

b. DV/DT and DI/DT protection for semiconductors.

c. All live power equipment shall be covered by protective shields to ensure the safety of operating personnel.

d. Metal oxide varistors.

9. The AFC shall have the following separate adjustments available:

a. Maximum frequency: 66 Hz.

b. Minimum frequency: 0 to 5 Hz.

c. Acceleration: 0.1 to 360 seconds standard.

d. Deceleration: 0.1 to 360 seconds as standard.

e. Volts/hertz: Programmable.

f. Maximum load: 150% for one minute.

g. Current limit: 50% to 150% of sine wave current rating.

h. Regulation frequency stability long term: ±0.01% of base speed.

i. Slip compensation: -1/2 to 1% speed regulation.

10. The AFC shall be designed and constructed to operate within the following service conditions:

a. Elevation: to 3,300 feet without derating.

b. Ambient operating temperature range: 0ºC to 40ºC.

c. Atmosphere: Non-condensing relative humidity to 95%.

d. A-C line voltage variation: -5% to +10%.

e. A-C line frequency variation: ±2 Hz.

C. The energy efficient motor shall utilize premium materials and optimized design for energy efficient performance and minimum losses on adjustable frequency power. Motors shall have the following electrical design features:

1. Full Class F, non-hygroscopic insulation system evaluated in accordance with IEEE-117 classification tests.

2. Motors shall be rated with a minimum 1.15 service factor on sine wave power and electrical design shall not exceed the insulation allowable temperature rise at 1.0 service factor on adjustable frequency power.

3. Motor windings shall be of copper.

4. Motor rotor construction shall be die cast aluminum or fabricated copper or their respective alloys. Rotor on frames 213T and above shall be keyed to shaft and rotating assembly dynamically balanced to NEMA limits per MG1-12.05. Balance weights, if required, shall be secured to the rotor resistance ring or fan blades by rivets. Machine screws and nuts are prohibited.

5. The motor shall use an open bearing (non-shielded) positive lubrication system. The design of this positive lubrication system shall minimize contaminant entry into bearings and protect against over lubrication and corrosion and grease migration into motor.

6. All mounting hardware shall be hex head, high strength, SAE Grade 5, zinc plated for corrosion protection. Screwdriver slot fasteners are prohibited.

7. TEFC motors with external cooling fans shall have fan covers with openings meeting the "guarded" definition of NEMA.

8. TEFC motors shall have provision for drainage of condensation at low points of the enclosure.

9. Each completed and assembled motor shall receive a routine factory test per NEMA standards. Test shall include winding resistance, no load current and power, high-potential test and mechanical vibration check.

10. Motor efficiency shall meet or exceed NEMA premium efficiencies.

D. Manual Bypass Transfer Switch:

1. Provide a full voltage, 3-contactor motor transfer switch to directly switch the motor between the AFC output and the incoming power line. This switch is mechanically interlocked between the AFC and the bypass modes of operation. It is a motor horsepower rated switch which is UL listed as a manual motor starter without the requirement for a separate magnetic bypass motor starter.

2. Provide a main incoming disconnect circuit breaker (MCB) with a through-the-door handle, which is interlocked with the bypass cabinet door.

   a. This thermal magnetic circuit breaker will provide short circuit protection for motor while operating in the bypass mode in accordance with the

requirements of the National Electrical Code (NEC).

b. Provide complete with the through-the-door handle to meet the National Electrical Code requirements for a lockable means of disconnect. This disconnect will remove all power from both control cabinets and the motor in all operating modes.

3. To meet the requirements of the National Electrical Code for motor thermal or current protection, a thermal overload relay (OL), sized for the motor nameplate full load amps (FLA) or the AFC “Sine Wave Amp” rating, whichever is lower, shall be provided.

4. For the air handling units, provide a complete manual bypass switch and AFC mounted in a common cabinet, NEMA 1 wall mounted, ventilated.

E. Provide integral 5% input AC line reactors with each VFD as sized per the VFD manufacturer's recommendation. If integral DC link reactors are provided with the VFD, also provide external AC line reactor.

2.05 EQUIPMENT HANGERS AND SUPPORT

A. Hangers and supports shall be of manufacturer and type specified or approved equal.

B. Supports:

1. Equipment shall be supported from structural steel, grouted CMU walls, or concrete slab only; piping shall not be supported in any manner from the roofing.

2. Drilled-in threaded inserts: Where supports in slabs are required after concrete has been poured, Phillips “Redhead” drilled in threaded inserts shall be provided, installed in accordance with manufacturer's recommendations.

3. Expansion anchors and powder-actuated fasteners and devices: Install lead shield anchors or powder actuated fasteners and devices in accordance with manufacturer's recommendations.

C. Supplementary Steel: Provide all necessary supplementary steel for proper support or attachment of hangers. Steel shall be painted with one coat of rust inhibiting primer.

2.06 VIBRATION ISOLATION

A. Unless otherwise noted on Equipment Schedule, all mechanical equipment shall be mounted on vibration isolators to prevent transmission of vibration and mechanically transmitted sound to building structure. Vibration isolator shall be selected in accordance with weight distribution so as to produce reasonably uniform deflection. Deflections shall be minimum of one inch for all equipment.

1. For ceiling suspended units: Where factory installed internal or external mounted vibration isolators are not provided, provide vibration hangers containing a spring and a double deflection neoprene element in series. Neoprene elements shall have a minimum deflection of 0.35". Spring diameters shall be no less than 0.8 of compressed height of spring at rated load. Springs shall have minimum additional travel to solid equal to 50% of rated deflection. Hangers shall be as manufactured by Mason Industries, Inc., M. W. Sausse, Amberbooth or approved equal.

2. Pipe isolation: Piping connected to mechanical equipment shall be isolated from building structure throughout its turns by hangers or supports in accordance with the isolators specified in Section 15181 – Chilled Water Piping.

2.07 MOTORS

A. Provide high efficiency type motors designed for the supply voltages made available for this portion of the work, and with the following attributes:

1. Sized to develop the required brake horsepower and to operate satisfactorily with a voltage variation of plus or minus 10%;

2. Conforming to NEMA motor standards;

3. Dynamically balanced, and held to commercial tolerance;

4. Selected so that, when ambient temperature reaches 120ºF for a period of 2 hours or more, the motor will operate satisfactorily without failure.

5. With squirrel-cage type drip-proof enclosure, unless otherwise indicated, constant speed, across-the-line normal starting torque designed for quiet operation;

6. Each motor of ample size to operate its unit at proper full load and speed

continuously, without heating in any part more than 40ºC above the temperature of the surrounding atmosphere.

7. Where TEFC motors are indicated or specified, the cast iron frame type shall be provided.

8. Provide inverter duty motors for use with variable frequency drives.

B. Where motor is used with V-belt drive, equip with a sliding base and belt guard, and motor sheave.

C. Furnish motor starters for all equipment with electrical motors furnished under this section. Unless factory installed, installation of starters and power wiring shall be provided by Division 16 – ELECTRICAL.

2.08 MOTOR CONTROLLERS

A. NEMA ICS1 and NEMA ICS2. All controllers shall have thermal overload protection in each phase. Overload protective devices shall give adequate protection to the motor windings and be of the thermal inverse-time-limit type.

B. Provide full voltage, magnetic-type motor controllers with under voltage release and maintained contact push-button stations or switches. Provide each controller with a hand-off-automatic selector switch. Connections to the selector switch shall be such that only the normal automatic regulatory control devices will be bypassed when the switch is in the “hand” position. All safety control devices, such as low- and high-pressure cutouts, high temperature cutouts, and motor overload protective devices, shall be connected in the motor control circuit in both the “hand” and the “automatic” positions. Control circuit connections to any hand-off-automatic selector switch or to more than one automatic regulatory control device shall be made in accordance with an indicated, or a manufacturer's approved, wiring diagram.

C. For each motor not in sight of the controller, provide a controller disconnecting means capable of being locked in the open position or a manually operated, non-fused switch in sight of the motor.

D. Enclosures shall be NEMA Type 1 for indoor locations and NEMA Type 4X, non-metallic for outdoor locations.

E. Provide each with a “hand-off-auto” switch, overload reset button, and indicating lights mounted on the hinged front cover with door interlock and manual defeater mechanism. Provide indicating lights (green for “Running” and red for “Overload”), phase failure and reversal relay, auxiliary contacts for contactors (1-N.O. and 1-N.C. unless noted otherwise), engraved plastic nameplates (“AHU-A1, B1, C1, C2 and E1”, etc.), control transformer, and fuses.

2.09 SPECIAL WIRING

A. All factory assembled, package type equipment shall be provided with integral control panel to which all motors in each unit shall be factory wired. Control panel shall contain all relays, starters, and other control devices, all arranged so as to be accessible for maintenance, testing, and inspection. Control panel on each unit shall contain control transformer installed so that all control circuits extending to remote control devices, thermostats, etc., will be 120 volts maximum.

B. Any wiring not shown and required for air conditioning to properly connect equipment, including connections to special safety control or apparatus not shown, shall be included under this section. Unless otherwise indicated, all control wiring for control power and for air conditioning control communication shall meet the requirements of the NEC and be installed in metal conduit.

PART 3 - EXECUTION

3.01 COOPERATION WITH OTHER TRADES AND CONFLICT IN WORK

A. Contractor shall examine all drawings of proposed work and coordinate his work with other trades. Work conflicts shall be brought to attention of WHFD AND/OR PROJECT MANAGER and work rearranged or modified in accordance with his decision.

B. If changes in indicated locations or arrangements of work are required, they shall be made by Contractor without additional charge to the WHFD AND/OR PROJECT MANAGER provided that these changes were ordered before work is installed and no extra material or labor are required.

C. Should Contractor determine that extra material and labor will be required to accommodate any rearrangement, he shall first submit detailed estimate of cost

for required changes and proceed with work only upon written authority of the WHFD AND/OR PROJECT MANAGER.

3.02 EQUIPMENT INSTALLATION

A. Equipment shall be installed as indicated and in accordance with manufacturer's recommendations and instructions.

B. All necessary supports shall be provided for equipment, appurtenances and duct as required. This work shall include any additional steel purlins, brackets, seismic restraints or supports.

C. Provide controls as indicated for proper operation of the equipment. Provide all necessary relays, contactors, enclosures and transformers to ensure proper system operation.

3.03 WORKMANSHIP AND FABRICATION

A. Ductwork: See Section 15810 – Ductwork & Ductwork Accessories for interconnecting ductwork to air handling equipment.

B. Piping: See Section 15181 – Chilled Water Piping for interconnecting piping to air handling equipment.

3.04 EQUIPMENT SUPPORT

A. Refer to drawings for type of construction from which equipment is to be supported. Structural metal supports shall be provided as indicated.

3.05 VIBRATION ISOLATION

A. See Section 15070 – Mechanical Sound, Vibration, & Seismic Control for interconnecting piping to air handling equipment

3.06 PAINTING AND IDENTIFYING OF PIPING

A. General:

1. The following items furnished under this section are to be painted and identified under Section 09900 – Painting. Do not paint over nameplates or other identifying labels.

    a. Exposed piping and insulated piping.

    b. Exposed ducts and hangers.

2. Paint exposed black iron work including pipe, fittings, structural steel members used for equipment, pipe, duct and other supports, iron body valves, pipe hangers, etc., with 2 coats of zinc rich paint.

B. Identification of Piping: Provide identification of all new pipe lines in accordance with the requirements of Section 15000 – General Mechanical Requirements.

C. Identification of Valves: Provide valve I.D. tags for all valves shown on the drawings in accordance with the requirements of Section 15000 – General Mechanical Requirements.

D. Identification of Equipment and Devices: Provide equipment identification tags for all equipment and devices shown on the drawings in accordance with the requirements of Section 15000 – General Mechanical Requirements.

3.07 ADJUSTING AND CLEANING

A. Pipes shall be cleaned free of scale and thoroughly flushed of all foreign matter. Equipment shall be wiped clean, with all traces of oil, dust, dirt, or paint spots removed. Temporary filters shall be provided for all fans that are operated during construction and after all construction dirt has been removed, new filters shall be installed. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Belts shall be tightened to proper tension. All valves and other miscellaneous equipment requiring adjustment shall be adjusted to setting indicated or directed. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.08 TESTING, ADJUSTING AND BALANCING

A. Test, adjust and balance each piece of equipment as required to assure proper operation. See Section 15950 – HVAC Testing/Adjusting/Balancing for further requirements.

3.09 CALIBRATION AND ADJUSTMENTS

A. After completion of the installation, perform final calibrations and adjustments of the equipment provided under this contract and supply services incidental to the proper performance of the unit control panels under warranty.

3.10 ACCEPTANCE PROCEDURE

A. Upon completion of the calibration, Contractor shall start-up the air conditioning system and perform all necessary testing and run diagnostic tests to ensure proper operation. Contractor shall be responsible for generating all software and entering all database necessary to perform the sequence of control and specified software routines. An acceptance test in the presence of the WHFD AND/OR PROJECT MANAGER shall be performed.

B. Provide operational acceptance tests. The tests shall be performed during a normal day of operation after the air conditioning system has been completely installed and made operable. Results of the tests shall be indicated on the Operational Performance Test form attached and shall be part of the submittal for the testing and balancing report.

3.11 POSTED OPERATING INSTRUCTIONS

A. Furnish approved operation instructions for each principal item of equipment for the use of the operation and maintenance personnel. The operation instructions shall include wiring diagrams, control diagrams and control sequence for each principal item of equipment. Operating instruction shall be printed or engraved and shall be framed under glass or in approved laminated plastic and posted where directed by the WHFD AND/OR PROJECT MANAGER. Operating instruction shall be attached to or posted adjacent to each principal item of equipment including start-up, procedure in the event of equipment failure and other items of instruction as recommended by the manufacturer of each item of equipment. Operating instructions exposed to the weather shall be made of weather-resistant materials or shall be suitably enclosed to be weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

3.12 FIELD INSTRUCTION

A. See requirements in Section 15000 – General Mechanical Requirements for field instruction of air conditioning and ventilation system. Upon completion of the work and at a time designated, the services of one or more qualified personnel shall be provided by the Contractor for a period of not less than 8 hours to instruct the Owner in the operation and maintenance of the air conditioning

system. These field instructions shall cover all the items contained in the bound instructions.

END OF SECTION

SECTION 15810 – DUCTWORK AND DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 WORK DESCRIPTION

A. This section covers the furnishing, fabrication, delivery and installation of the air conditioning and ventilation system complete, including, but not limited to, the following:

1. Sheet metal duct and duct insulation.
2. Diffusers, registers and grilles.
3. Flexible ducts.
4. Volume dampers, balancing dampers.
5. Operation and maintenance instructions and manuals.
6. Manufacturer's literature, shop drawings and record drawings.
7. Inspection, test and guarantee.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Section 08900 – Louvers.

B. Section 09900 – Painting.

C. Division 15 – Mechanical.

D. Section 15000 – General Mechanical Requirements.

E. Section 15080 – Mechanical Insulation.

F. Section 15720 – Air Handling Units.

G. Section 15910 – Direct Digital Control Systems.

H. Section 15950 – HVAC Testing/Adjusting/Balancing.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures and Section 15000 – General Mechanical Requirements.

B. Shop Drawings: Submit shop drawings of plans, performance data and details showing locations and installation including, but not limited to, the following:

1. Ductwork, air devices and other duct mounted devices including controls provided by Section 15910 – Direct Digital Control Systems.

C. Product Data: Submit product data for the following:

1. Variable air volume terminals.

2. Air devices.

3. Flexible ducts

4. Volume dampers, balancing dampers.

D. Schedules:

1. Schedule of equipment listing name and addresses of manufacturers; manufacturer's local supplier's name, address and phone number; catalog numbers and trade names in accordance with Section 15000 – General Mechanical Requirements.

2. Maintenance service contract and schedule

E. Reports: See Section 15950 – HVAC Testing/Adjusting/Balancing for testing and balancing reports.

F. Certificates of Conformance or Compliance: None.

G. As-Built Drawings: Submit drawings in accordance with Section 15000 – General Mechanical Requirements.

H. Operation and Maintenance Manuals: Submit manuals in accordance with Section 15000 – General Mechanical Requirements.

I. Guarantee and Certificate: Submit one-year guarantee and certificate in accordance with Section 15000 – General Mechanical Requirements.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Air conditioning and ventilation equipment to be considered for bid purposes shall be from a manufacturer that has locally stocked spare parts, representation, and support of a factory authorized service organization within 500 miles of the site of installation and has serviced manufacturer's units of comparable type, size and capacity as those specified herein. The manufacturer must have other units of comparable type, size and capacity installed and operating satisfactorily in the State of Hawaii for a minimum of 2 years prior to bid opening.

2.02 AIR DEVICES

A. Supply Air Diffuser – SAD: Provide Titus Model TDC-AA series or approved equal. Diffuser shall be louvered face, aluminum, 24" x 24" lay in module with adjustable pattern, in sizes, capacities and patterns as indicated. Provide removable center core with opposed blade volume damper, square neck and standard white finish or as indicated.

B. Return, Exhaust and Transfer Air Register – RAR, EAR, TAR: Provide Titus Model 350FL series, or approved equal. Register shall be louvered, aluminum, surface mounted, 3/4" louver spacing, 35 degree fixed deflection angle with blades parallel to long dimension and in sizes and capacities as indicated. Provide opposed blade damper and standard white finish or as indicated.

C. Provide sponge rubber under all flanges.

D. Contractor shall coordinate finish of all air devices with the WHFD AND/OR PROJECT MANAGER.

2.03 DUCTWORK MATERIALS

A. All ductwork and plenum chambers shall be galvanized metal installed of gauges and with bracing and joints all in accordance with latest edition of ASHRAE Guide and SMACNA Duct Construction Standards.

B. For air conditioning and general ventilation systems, the thickness of the sheet metal and size and spacing of the stiffeners used shall be in accordance with the requirements of the latest edition of the ASHRAE Guide and Data Book and SMACNA HVAC Metal Duct Standard, +2-inch W.G. static pressure class, Seal

Class A except main supply duct and branches upstream of the VAV boxes shall be constructed for +4 inches design pressure class, Seal Class A. Connections to plenum shall be airtight. No polysulfide sealant shall be used. Polyurethane sealant is acceptable. Round take-offs shall be made with prefabricated conical tap-offs with locking damper.

C. Plenums shall be braced with 1-1/2" x 1-1/2" x 1/8" angles. Hangers shall be one inch x 18-gauge or as required by SMACNA. Brace ducts in accordance with SMACNA recommendations for seismic loads.

D. Flexible Duct: Fiberglass insulated, flexible duct with fiberglass reinforced metallized film vapor barrier, coated spring steel wire helix and woven inner liner, UL listed under UL Standard 181, Class 1 flexible and complying with NFPA 90A and 90B. Length of flexible duct to air devices shall not exceed 8 feet. Flexible ducts only allowed for connecting rigid duct to air devices or VAV boxes and for plenums of the air devices. Thermaflex Model MKE for low pressure ductwork systems (i.e., downstream of VAV boxes) and Model MKC for medium pressure ductwork systems (i.e., upstream of VAV boxes) or approved equal.

E. Provide duct access panels in accordance with SMACNA Duct Construction Standards and NFPA 90A and 96.

2.04 DUCT INSULATION

A. See Section 15080 – Mechanical Insulation for requirements of duct insulation.

2.05 VOLUME DAMPERS, BALANCING DAMPERS

A. Volume Dampers: Volume dampers shall be installed where shown and as required for air balancing. Dampers shall be 2 gages heavier than the duct in which they are installed and shall be reinforced to prevent vibration and noise. Unless otherwise indicated, all volume dampers in ductwork 10 inches or greater, in either width or height, shall be opposed blade type and meet SMACNA Duct Construction Standards. Branch dampers as indicated are required regardless if the air devices are provided with volume dampers. Provide Ruskin, Pottorff or approved equal.

B. Balancing Dampers: Balancing dampers for branches and mains shall be equipped with Young Regulator No. 1, Dura Dyne or approved equal.

C. Backdraft Dampers: Backdraft dampers shall be adjustable, counterbalanced type, heavy duty extruded aluminum, minimum 0.125-inch wall thickness frame, minimum 0.070-inch wall thickness blades with vinyl edge seals, maximum allowed spot velocity of 3500 fpm and maximum air temperature of 200 degrees
1. Provide front flange: Provide Ruskin CBD6, Pottorff or approved equivalent.

2.06 FIRE DAMPERS

A. Fire dampers shall have UL 1.5-hour rating and shall be equipped with electric/thermal link which closes damper at 165 degrees F and then automatically resets after normal temperature is restored by cycling damper operator. Provide Type B damper except dampers located within concrete walls may be Type A.

2.07 ACCESS PANELS

A. Furnish access panels for dampers, fire dampers, fire/smoke dampers, coils, fans, air handlers; filters, inlet side of coils, cold plenums, hood exhaust duct cleanout locations, valves, condensate drain standpipes, where indicated of size shown or required to access for maintenance. Access panels in fire rated ceiling assemblies or walls shall be rated equal to or greater than the assembly in which it is installed. Access panels shall be coordinated with location of duct mounted access panels.

2.08 FLEXIBLE CONNECTIONS FOR DUCTWORK

A. At ducts to equipment and where indicated, provide vent-fabric flexible connections with a minimum of 9-inch full length.

2.09 SPECIAL WIRING

A. All factory-assembled, package type equipment shall be provided with integral control panel to which all motors in each unit shall be factory wired. Control panel shall contain all relays, starters, and other control devices, all arranged so as to be accessible for maintenance, testing, and inspection. Control panel on each unit shall contain control transformer installed so that all control circuits extending to remote control devices, thermostats, etc., will be 120 volts maximum.

B. All field installed control wiring not shown and required for the control of the air conditioning system including connections to duct mounted items (e.g., motorized

dampers), to special safety control or apparatus (e.g., duct smoke detectors) and to the DDC system from the duct mounted items shall be included under this section. Control wiring shall include both control power (i.e., 120 volts or less) and communication for control signals. All control wiring shall meet the requirements of the NEC and shall be installed in metal conduit throughout.

PART 3 - EXECUTION

3.01 COOPERATION WITH OTHER TRADES AND CONFLICT IN WORK

A. Contractor shall examine all drawings of proposed work and coordinate his work with other trades. Work conflicts shall be brought to attention of WHFD AND/OR PROJECT MANAGER and work rearranged or modified in accordance with his decision.

B. If changes in indicated locations or arrangements of work are required, they shall be made by Contractor without additional charge to the WHFD AND/OR PROJECT MANAGER provided that these changes were ordered before work is installed and no extra material or labor is required.

C. Should Contractor determine that extra material and labor will be required to accommodate any rearrangement, he shall first submit detailed estimate of cost for required changes and proceed with work only upon written authority of the WHFD AND/OR PROJECT MANAGER.

3.02 EQUIPMENT INSTALLATION

A. Equipment shall be installed as indicated and in accordance with manufacturer's recommendations and instructions.

B. All necessary supports shall be provided for equipment, appurtenances and duct as required. This work shall include any additional steel purlins, brackets, seismic restraints or supports.

C. Provide controls as indicated for proper operation of the equipment. Provide all necessary relays, contactors, enclosures and transformers to ensure proper system operation.

3.03 WORKMANSHIP AND FABRICATION

A. Galvanized Steel Ductwork:

1. Fabricate all ductwork and related work to highest industry standards and recommendations of ASHRAE and SMACNA. Provide all necessary supplementary steel structure supports, purlins or brackets to support duct properly from structure.

2. Sides of ductwork shall be cross broken or beaded per SMACNA Duct Construction Standards. Long seams shall be Pittsburgh lock groove, hammered flat or double seamed. Ducts shall also have supplemental stiffening as required to prevent drumming and to provide structurally sound assembly.

3. Center line radius of curves, bends, offsets for branch and connections shall be equal to 1-1/4 times duct width or larger. Duct turns in all square elbows shall be accomplished by using prefabricated turning vanes in accordance with SMACNA Duct Construction Standards. Double thickness turning vanes in ducts deeper than 16 inches may be used if prior approval of design is given by the WHFD AND/OR PROJECT MANAGER.

4. Volume and splitter dampers shall be installed where required and shall be provided with extension rods for adjusting and locking. Dampers shall be made of not lighter than 18-gauge steel for dimensions up to 10 inches, and multi-louvered, opposed blade type on ducts over 10 inches high. All dampers shall have Young Regulator No. 401 locking quadrants, Dura Dyne or approved equal.

5. Paint inside of all supply, return, exhaust and transfer air ducts with one coat of flat black paint wherever duct is visible through register or grille opening.

6. Ducts passing through outside walls shall be suitably and properly flashed and counter flashed to prevent leaks. Fresh air intake or ventilation opening shall be provided with screened intakes.

3.04 ADJUSTING AND CLEANING

A. Equipment shall be wiped clean, with all traces of oil, dust, dirt, or paint spots removed. Temporary filters shall be provided for all fans that are operated during construction and after all construction dirt has been removed, new filters shall be installed. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Belts shall be tightened to proper tension.

All dampers and other miscellaneous equipment requiring adjustment shall be adjusted to setting indicated or directed. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.05 TESTING, ADJUSTING AND BALANCING

A. Test, adjust and balance each piece of equipment as required to assure proper operation. Testing, adjusting and balancing is specified in Section 15950 – HVAC Testing/Adjusting/Balancing.

3.06 CALIBRATION AND ADJUSTMENTS

A. After completion of the installation, perform final calibrations and adjustments of the equipment provided under this contract and supply services incidental to the proper performance of the unit control panels under warranty.

3.07 ACCEPTANCE PROCEDURE

A. Upon completion of the calibration, Contractor shall start-up the air conditioning system and perform all necessary testing and run diagnostic tests to ensure proper operation. Contractor shall be responsible for generating all software and entering all data base necessary to perform the sequence of control and specified software routines. An acceptance test in the presence of the WHFD AND/OR PROJECT MANAGER shall be performed.

3.08 POSTED OPERATING INSTRUCTIONS

A. Furnish approved operation instructions for each principal item of equipment for the use of the operation and maintenance personnel. The operation instructions shall include wiring diagrams, control diagrams and control sequence for each principal item of equipment. Operating instruction shall be printed or engraved and shall be framed under glass or in approved laminated plastic and posted where directed by the WHFD AND/OR PROJECT MANAGER. Operating instruction shall be attached to or posted adjacent to each principal item of equipment including start-up, procedure in the event of equipment failure and other items of instruction as recommended by the manufacturer of each item of equipment. Operating instructions exposed to the weather shall be made of weather-resistant materials or shall be suitably enclosed to be weather protected.

Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

3.09 FIELD INSTRUCTION

A. Requirements for field instruction are specified in Section 15000 – General Mechanical Requirements.

3.10 OPERATION AND MAINTENANCE MANUAL

A. Provide hard bound copies of the Operation and Maintenance Manual on all equipment and the system as a whole. Provide manuals in accordance with the requirements of Section 15000 – General Mechanical Requirements.

END OF SECTION

SECTION 15910 – DIRECT DIGITAL CONTROL SYSTEMS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 WORK DESCRIPTION

A. This section covers the furnishing, fabrication, delivery and installation of the Direct Digital Control (DDC) system for the control and monitoring of the air conditioning system. The Contractor shall provide a complete and working system, including, but not limited to, the following:

1. Hardware.
2. Software.
3. Control wiring and conduit for site and for interior areas.
4. Operation and maintenance instructions and manuals.
5. Manufacturer's literature, shop drawings and record drawings.
6. Inspection, test and guarantee.

B. Provide new DDC components to connect the existing DDC system including associated equipment, control wiring, conduit, termination boards and accessories. Provide each control system complete and operating as specified. All control wiring exterior to the building shall be provided in conduit that conforms to the NEC. Manufacturer's products, including design, materials fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with NFPA 70, except as modified in this section or indicated otherwise.

C. The DDC system shall maintain stable temperature control for comfort cooling, humidity control where humidity is the sensed variable and all other conditions indicated. The end-to-end accuracy of the system, including temperature sensor error, wiring error, A/D conversion, and display, shall be 1ºF.

D. DDC system shall be provided by Setpoint Systems (www.setpointsystems.com). Contractor shall provide all necessary components, interface devices, translators, equipment and software and hardware to meet the performance requirements indicated and in accordance with the recommendations of the controls manufacturer, for their particular system.

1.03 RELATED WORK SPECIFIED IN OTHERS SECTIONS

A. Division 15 – Mechanical.

B. Section 15000 – General Mechanical Requirements.

C. Section 15720 – Air Handling Units.

D. Section 15810 – Ductwork & Ductwork Accessories.

E. Section 15950 – HVAC Testing/Adjusting/Balancing.

F. Division 16 – Electrical.

1.04 DEFINITIONS

A. BACnet: BACnet is a standard communication protocol under development by the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE). The controller manufacturer shall have a company policy to support the implementation of BACnet.

B. Digital Controller: A control module which is microprocessor based, programmable by the user, has integral I/O, and performs stand-alone operations.

C. Direct Digital Control: A digital controller as defined in this document. The controller directly senses building environment and makes control decisions based on user defined, controller resident programs. The controller outputs control signals that directly operate valves, dampers, and motor controllers. No conventional control devices, pneumatic or electronic, such as receiver-controllers, thermostats, and logic units are present within or interface with a direct digital control loop. Actuators are electric or pneumatic and the controller output is converted to the appropriate type of signal.

D. DDC System: A system made up of one or more digital controllers. Required climate control and energy management functions for complete operation of a

heating, ventilating, and air conditioning (HVAC) system are provided by DDC from digital controllers. No conventional control devices (pneumatic or electronic) such as receiver-controllers, thermostats and logic units are used. Digital controllers in a system are linked in a communication network composed of one or more levels of local area networks (LAN).

E. Distributed Control: The intent of distributed control is to install the controllers near the equipment being controlled, and to distribute the processing to each stand-alone DDC panel. The control system is built up of stand-alone controllers, utilizing sensor inputs and control outputs.

F. Dynamic Control: A process that optimizes operation of HVAC systems (air handler units, converters, chillers, and boilers) by increasing and decreasing set points or starting and stopping equipment in response to heating and cooling needs of downstream equipment. A requirement of dynamic control is knowing the heating/cooling demand status of downstream equipment, therefore dynamic control requires controllers connected in a communications network.

G. Firmware: Firmware is software programmed into read only memory (ROM) and erasable programmable read only memory (EPROM) chips. Software may not be changed without physically altering the chip.

H. Graphic Sequence of Operation: A drawing or graphic showing all interlocks and control loop sequences between the input and output points. Graphic sequence of operation is a graphical representation of the sequence of operation. The graphic sequence of operation will show all inputs, outputs and logic blocks.

I. Hand-Held Terminal: A hand-held terminal is a portable device, control system manufacturer-specific, which can be connected directly to a communications port on a digital controller and through which the digital controller can be interrogated and, in some cases, programmed.

J. Input/Output (I/O): I/O refers to analog inputs (AI), digital inputs (DI), analog outputs (AO), and digital outputs (DO) in a digital controller. Inputs are from analog sensors (temperature, pressure, humidity, flow) and digital sensors (motor status, flow switches, switch position, and pulse output devices). Outputs operate modulating and on/off control devices.

K. I/O Unit: An I/O unit provides additional point capacity to a digital controller and communicate with the stand-alone digital controller on LAN. An I/O unit is not stand-alone because the control program does not reside in the I/O unit microprocessor.

L. Integration: The ability of control system components to have interoperability between different manufacturers to connect together and provide coordinated control via real-time data exchange and control functions through a common communications data exchange protocol. Integration shall extend to the operator's workstation software, which shall support user interaction with all control system components. Methods of integration include industry standard protocols such as: BACnet, ARCnet, LonMark/LonTalk, OLE for Process Control (OPC) or integrator interfaces between cooperating manufacturer's systems.

M. Local Area Network:

1. A communications bus that interconnects digital controllers for peer-to-peer communications. Different levels of LANs are possible within a single DDC system. In this case, a digital controller on a higher level LAN acts as a network controller to the controllers on the lower level LAN. The network controller, then, has at least 2 LAN communications ports. One port supports peer-to-peer communications with other digital controllers on the higher level LAN. The other port supports communications with the digital controllers on the lower level LAN.

2. LAN's permit sharing global information, make it possible to apply building wide control strategies such as peak demand limiting, permit dynamic control strategies, allow coordinated response to alarm conditions, and permit remote monitoring and programming of digital controllers.

3. Facility-wide LAN refers to a commercially available local area network. These LANs allow the connection to an existing or new facility-wide LAN.

N. Microprocessor: A microprocessor refers to the central processing unit (CPU) that contains all the registers and logic circuitry that make it possible for digital controllers to do computing.

O. Open Protocol Bus (OPB): A pre-programmed communications integrator that allows devices from one manufacturer to communicate and interact with those of another.

P. Open System Port (OSP): A user programmable communications port that provides the ability to develop custom communications processes to integrate other operating systems with the DDC system.

Q. Output Signal Conversion: Output signal conversion refers to the changing of one kind of control output into a proportionally related signal appropriate for direct actuation of the controlled device. Signals are converted by a transducer which may be external to the digital controller originating the output.

   1. Examples in modulating control of pneumatic actuators are conversion of 4-20 mA signals into proportional 3-15 psig signals.

   2. An example of output signal conversion in on/off or open/close control is a contact closure originating in a digital controller which activates a solenoid air valve which passes main air, thereby forcing a damper to open fully.

R. Optimum Start: Optimum start is a method of starting the HVAC equipment prior to occupancy time in order to have the building at set point at occupancy. Optimum start shall be based on the zone temperatures, zone set points, and outdoor temperature. Optimum start will bring the zone to set point at occupancy time.

S. Peer-to-Peer: Peer-to-Peer refers to controllers connected on a communications LAN that act independently, as equals and communicate with each other to pass information which facilitates control.

T. PID: PID refers to proportional, integral, and derivative control; the 3 types of action that are used in controlling modulating equipment.

U. Resolution: Refers to the number of possible states an input value or output value can take and is a function of the digital controller I/O circuitry; the A/D converter for input and the D/A converter for output. Ten-bit resolution has 1024 possible states and 8-bit resolution has 256 possible states.

V. Stand-Alone Control: Refers to the digital controller being able to perform required climate control, and energy management functions without connection

to another digital controller or central site computer. Digital controller requirements for stand-alone control are a time clock, a microprocessor, microchip resident control programs, PID control, a communications port for interfacing with and programming the controller, firmware for interrogation and programming, and I/O for sensing and effecting control of its control environment.

W. Terminal Control Unit (TCU): An off-the-shelf, stand-alone digital controller equipped for communication on a lower level local area network. TCUs may deviate from stand-alone only in receiving energy management and time information from a stand-alone digital controller. A TCU is commonly application specific and is used for distributed control of specific HVAC subsystems. A TCU communicates with the digital controllers. Typically, a TCU communicates on a lower level LAN. Examples where TCUs might be used to control of small air handling units (AHUs), variable air volume (VAV) boxes, fan coil units, and heat pumps.

1.05 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. Manufacturer's Catalog Data:

1. DDC hardware.
2. DDC capabilities.
3. Input devices.
4. Output devices.
5. Surge and transient protection.
6. Panel mounted display and keypad.

C. Equipment and software for which specification compliance data shall be submitted include but not limited to the following:

1. DDC hardware:

a. I/O; capable of supporting platinum RTD, precision thermistor, 4-20 mA, 0-10 VDC.

b. Programs will reside in microprocessor; controllers are stand-alone.

c. Communications ports; all communications ports as specified.

d. Protected memory; minimum hours required by this specification.

e. Operating temperature limits.

2. DDC capabilities:

a. Communications; baud rate, communication ports, stand-alone.

b. Trending; capable of trending every point.

c. Alarming; capable of alarm generation as indicated.

d. Messages; as indicated.

e. Self-diagnostics; identification of a failed module.

f. PID control; capable of PID control.

3. Input devices:

a. Transmitters; accuracy, 4-20 mA, 0-10 VDC.

b. Temperature sensors; accuracy, stability, 100% factory screening, platinum RTD or thermistor.

c. Pressure sensor; accuracy.

d. Flow or motor proof; type.

e. Sensor wells; type.

4. Output devices:

a. Valves; types.

b. Actuators.

c. Control relays.

5. External surge and transient protection:

a. Power line.

b. Communications links and/or devices (between buildings).

D. Drawings: Submit the following drawings: Control system schematic.

E. Design Data: Submit test data demonstrating the following installed components will meet specification requirements.

1. Temperature sensor accuracy: Submit manufacturer specification of temperature sensor accuracy. Literature shall make clear sensor accuracy as specified.

2. Temperature sensor stability: Provide manufacturer specification of 5-year stability of RTDs and thermistors. Literature shall make clear sensor stability as specified.

F. Schedules:

1. List of shop drawings.

2. List of symbols and abbreviations used on shop drawings.

3. List of I/O points: For each input and output physically connected to a digital controller provide, on a controller by controller basis, provide the following:

   a. Point description: for example: mixed air temperature, supply fan start/stop, etc.

   b. Point type: AO, AI, DO, or DI.

   c. Point range: Shall be 4-20 mA, 3-15 psi, platinum RTD resistance ohm, thermistor.

   d. Sensor range associated with point range: For example, 0-100ºF, 0-2" of water.

   e. Software name(s) associated with point, if any.

   f. Terminal number to which point is connected.

4. Equipment components list: Submit a listing of controllers and connected devices shown on control system schematic. List the following:

   a. Control system schematic component name.

   b. Description.

   c. Manufacturer of controller.

   d. Controller's name.

e. Equipment part numbers.

f. Cv for valves.

g. For actuators:

i. Motive force (such as pneumatic, or electric).

ii. Normal position.

iii. Nominal operating range (such as 3-7 psi, 4-8 mA).

5. AC power table: Submit a table listing each controller and the circuit breaker number, panel box number, and physical location of each controller's source of AC power.

G. Statements:

1. Contractors' qualifications: Submit statements required in Part 1, Quality Assurance, Qualifications.

2. Training: Submit schedule, syllabus, and training materials in accordance with Part 3 – EXECUTION.

H. Records: Provide administrative and closeout submittals:

1. Training course documentation: Training course documentation shall include a manual for each trainee plus 2 additional copies and 2 copies of audiovisual training aids, if used. Documentation shall include an agenda, defined objectives for each lesson and detailed description of the subject matter of each lesson.

2. Service organization: Qualified service organization list that shall include the names and phone numbers of organizations qualified to service the HVAC control systems.

3. Contractor certification: Provide certification that the installation of the control system is complete and the technical requirements of this section have been met.

I. Operation and Maintenance Manuals:

1. Controls and HVAC system operator’s manual: Provide a controls and HVAC system operation and maintenance manual. This manual is designed to

document the HVAC and control system. Construct this manual using a 3-ring binder with a minimum of the following 7 sections. Use tabs to divide each section. Provide one hard copy and 3 electronic copies on CD.

a. Section 1: Description of HVAC Systems: Provide a description of the HVAC system components and control system. Include sequences of operation and a complete points list.

b. Section 2: Controls Drawings: Provide drawings as specified.

c. Section 3: Control Program Listings: Provide listing of all control programs, including terminal equipment controller setup pages.

d. Section 4: Current Operating Parameters: Provide printouts of input and output setup information, database setups. This section is intended to provide information such as point addresses, slopes and offsets for all points, database of points, etc.

e. Section 5: Design Information: Provide tab, but leave this section blank.

f. Section 6: Control Equipment Cut Sheets: Provide cut sheets of all controller hardware and accessories. Include temperature versus resistance charts for temperature sensors, and calibration charts for pressure transducers.

g. Section 7: Control Program: Provide a fully operational control system disk (CD disk format preferred) identical to the original control program as installed. In addition, provide a restore – backup disk of the control program and backup copy of AUTOCAD controls drawings. It is understood that the software will be available to the owner and used only for the buildings in this contract.

2. DDC manufacturer's hardware and software manuals. Controls and HVAC system operation and maintenance manual:

a. Section 1: Installation and Technical Manuals for all digital controller hardware.

b. Section 2: Operators Manuals for all digital controllers.

c. Section 4: Programming Manuals for all digital controllers.

1.06 STORAGE

A. Stored products shall be protected from the weather, humidity and temperature variations, dirt and dust, and other contaminants, within the storage condition limits published by the equipment manufacturer.

1.07 QUALITY ASSURANCE

A. General:

1. The direct digital control system herein specified shall be fully integrated and installed as a complete package by the DDC Contractor. The system shall include all wiring, piping, installation supervision, calibration, adjustments, and checkout necessary for a complete and fully operational system.

2. The DDC Contractor shall be regularly engaged in the engineering, programming, installation and service of direct digital control systems of similar size and complexity.

3. The DDC Contractor shall have a local facility on Oahu. Emergency service shall be available on a 24-hour, 7-day-a-week basis.

4. The DDC Contractor shall be responsible for all work fitting into place in a satisfactory and neat workmanlike manner acceptable to the WHFD AND/OR PROJECT MANAGER.

B. Experience Record:

1. The DDC Contractor shall have a minimum of 3 years of experience with the complete installation of direct digital control systems of similar size and technical complexity. The DDC Contractor shall provide a list of 3 comparable projects that have direct digital control systems with the features as specified for this project. These projects must be on-line and functional.

2. The DDC Contractor shall employ specialists in the field of direct digital control systems including: programming, engineering, field supervision, and installation. Specialists shall present factory-training certification of the submitted equipment upon request.

C. Governing Code Compliance: The DDC Contractor shall comply with all current governing codes, ordinances and regulations, including UL, NFPA, the local Building Code, NEC, and so forth.

D. FCC Regulation: All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Section 15, Governing Radio Frequency Electromagnetic Interference, and be so labeled.

E. Standard Products:

1. Materials and equipment shall be standard products of manufacturer regularly engaged in the manufacturing of such products, using similar materials, design and workmanship. The standard products shall have been in commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of similarly sized equipment and materials used under similar circumstances. The 2-year experience must be satisfactorily completed by a product, which has been sold on the commercial market through advertisements, manufacturer's catalogs, or brochures.

2. The equipment items shall be supported by a service organization.

F. Nameplate and Tags:

1. Nameplates bearing legends as shown and tags bearing device unique identifiers as shown shall be engraved or stamped. Nameplates shall be permanently attached to HVAC control panel doors.

2. For each field-mounted piece of equipment, not in a finished area, a plastic or metal tag with equipment name and point identifier shall be attached.

G. Verification of Dimensions: The Contractor shall become familiar with all details of the work, shall verify all dimensions in the field, and shall advise the WHFD AND/OR PROJECT MANAGER of any discrepancy before performing the work.

H. Drawings: Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. The Contractor shall carefully investigate the mechanical, electrical, and finish conditions that could affect the work to be performed, and shall finish all work necessary to meet such conditions.

I. Modification of References: The advisory provision in ASME B31.1 and NFPA 70 shall be considered mandatory. Substitute the word “shall” for “should” wherever it appears. Interpret reference to the “authority having jurisdiction”, the “Administrative Authority”, the “Owner”, or the “Design Engineer” to mean the “WHFD AND/OR PROJECT MANAGER”.

1.08 WORK INCLUDED

A. Installation of Direct Digital Control System:

1. The DDC Contractor shall furnish and install a complete DDC system for all mechanical systems and other facility systems as included in the project documents. The DDC system will provide the functional features as defined in Part 1 – GENERAL REQUIREMENTS, Part 2 – PRODUCTS, and Part 3 – EXECUTION of these specifications. The DDC Contractor shall provide a complete and operational system to perform all sequences of operations stated within Part 3 or shown on the control drawings.

2. The work under this section shall include all materials and labor to perform all work required for the installation of the DDC as specified.

3. The drawings and specifications are complementary to one another – meaning that what is called for on one is to be considered called for in both. Where conflicts exist between the specifications and/or drawings, the more stringent requirement shall apply.

4. The DDC Contractor shall be responsible for field verification of site conditions and for gathering all necessary field data for all items to be provided under this contract prior to submitting his or her bid.

5. Where work specified under other sections of this specification connects to equipment or systems that are listed and described in this section, the DDC Contractor shall provide proper connection(s) to such equipment including trade coordination.

6. The DDC Contractor shall tie-in the new work to the existing system including mapping of all new points to the existing system, modifying the existing operator interface graphic display to include all new equipment and points and integrating control, set point, alarm and trending functions for the new

equipment and points to the existing system.

1.09 COORDINATION

A. Divisions:

1. The DDC Contractor shall cooperate with other divisions performing work on this project as necessary to achieve a complete and neat installation. The Contractor shall also consult the drawings and specifications of all trades to determine the nature and extent of others' work.

2. Contractors, subcontractors, employees: It will be the duty of this Contractor to work in cooperation with other Contractors, and with other Subcontractors and employees, rendering assistance and arranging his or her work so that the entire project is complete and usable.

1.10 MANUALS

A. All manuals shall be provided in hard copy format or on a single Compact Disk (CD) as part of an on-line documentation system through the operator workstation.

PART 2 - PRODUCTS

2.01 SYSTEM ARCHITECTURE

A. First-Tier Network:

1. The first-tier network shall be based on a PC industry standard of Ethernet TCP/IP, ARCnet, or LONWORKS as compatible with the existing system.

2. The DDC system shall network multiple network controllers, system controllers, and application-specific controllers. The first-tier network shall provide communications between existing operator workstations and first tier DDC controllers.

3. The first-tier network shall operate at a minimum communication speed of 2.5 M baud, with full peer-to-peer network communication.

4. Network controllers shall reside on the first tier.

B. First Tier Network Protocol Integration:

1. The system installed under this contract shall allow bi-directional communications with the Owner's designated host system. Supported media shall include fiber, 10base2, and 10baseT.
2. The ability to share data and change of state (COS) between the Owner's designated host system and the system installed under this contract shall be provided.

C. Second Tier Network:

1. The second-tier network is used to communicate between the first tier DDC controllers and field controllers.
2. Second-tier networks shall utilize either “Peer-to-Peer”, Master-Slave, or Supervised Token Passing communications.

D. Second-Tier Controller Protocol Integration:

1. Hardwired:
    a. Analog and digital signal values shall be passed from one system to another via hardwired connections.
    b. There will be one separate physical point on each system for each point to be integrated between the systems.
    c. Analog points will be 4-20 mA signals originating at the “from system” and being received by the “to system.”
    d. Digital points will be “dry contact” signals originating at the “from system” and being received by the “to system”.
2. Direct protocol:
    a. The DDC system shall include appropriate hardware equipment and software to allow data communications between the DDC system and third-party manufacturers’ control panels. The DDC shall receive, react to, and return information from multiple building systems, variable frequency drives, power monitoring systems, etc.
    b. All data required by the application shall be mapped into the First-Tier Network DDC Controller's database, and shall be transparent to the operator.

c. Point inputs and outputs from the third-party controllers shall have real-time interoperability with DDC software features such as: Control Software, Energy Management, Custom Process Programming, Alarm Management, Historical Data and Trend Analysis, Totalization, and Dial-Up and Local Area Network Communications.

d. Integration shall be via RS-232 or RS-485 technologies.

e. The system operator shall have the ability to verify, and diagnose communication messages and point information between third-party controllers and the DDC system.

2.02 DDC SYSTEM – GENERAL

A. Provide a DDC system as a distributed control system. The system shall have stand-alone digital controllers, and a communications network.

B. Provide an operator programmable system, based on the user applications, to perform closed-loop, modulating and/or on-off control of building equipment. Connect all digital controllers through the communication network to share common data and report to workstation computers. The control system shall be capable of down-loading and up-loading of programs between the existing workstation and the digital controllers.

C. The DDC system shall be fully compatible with the existing system currently operating at the facility. Contractor to provide a fully compatible and coordinated system with tie-in to the existing system including mapping of all new points to the existing system, modifying the existing operator interface graphic display to include all new equipment and points and integrating control, set point, alarm and trending functions for the new equipment and points to the existing system. Access to the new equipment and points shall be through the existing operator interface front end software and shall not require parallel operation of another software interface.

2.03 DIGITAL CONTROLLERS

A. Provide the quantity of digital controllers indicated on the drawings that will perform required climate control, energy management, and alarm functions. The

quantity of controllers shall be no less than the number shown on drawings. All material used shall be currently in production.

B. Direct Digital Controllers: DDC hardware shall be UL 916 rated.

C. Distributed Control: Apply digital controllers in a distributed control manner.

D. Environmental Operating Limits: Provide digital controllers that operate in environmental conditions between 32ºF and 120ºF.

E. Stand-Alone Control: Provide stand-alone digital controllers.

F. Internal Clock: Provide clock with each controller on the first-tier local area network and shall have its clock backed up by a battery or capacitor with sufficient capacity to maintain clock operation for a minimum of 72 hours during a line power outage.

G. Memory:

1. Provide sufficient memory for each controller to support required control and communication functions.

2. Memory protection: Programs residing in memory shall be protected either by using EEPROM or by an uninterruptible power source (battery or uninterruptible power supply (UPS)). The backup power source shall have sufficient capacity to maintain volatile memory in event of an AC power failure. Where the uninterruptible power source is rechargeable (a rechargeable battery), provide sufficient capacity for a minimum of 72 hours back-up. The rechargeable power source shall be constantly charged by charging circuitry while the controller is operating under normal line power. Where a non-rechargeable power source is used, provide sufficient capacity for a minimum of 2 years accumulated power failure. Batteries shall be designed to allow replacement without soldering.

H. Inputs: Provide input function integral to the direct digital controller. Provide input type as required by the DDC design.

1. Analog inputs: Allowable input types are 3-wire 100 ohm or higher platinum RTD's, stable 10,000 ohm thermistors, 0-10 VDC and 4 to 20 mA. Thermistor and direct RTD inputs must have appropriate conversion curves stored in controller software or firmware. Analog to digital (A/D) conversion

shall be a minimum of 10-bit resolution.

2. Digital inputs: Digital inputs shall sense open/close, on/off, or other 2 state indications.

I. Outputs: Provide output function integral to the direct digital controller. Provide output type as required by the DDC design. Ensure that output of controllers is compatible with controlled devices.

1. Analog outputs: Provide controllers with a minimum output resolution of 8 bits. Output shall be 4 to 20 mA or 3 to 15 psi or 0-10 VDC. Each pneumatic output shall have feedback for monitoring of the actual pneumatic signal. Feedback shall be integral to the output function.

2. Digital outputs: Provide contact closure with contacts rated at a minimum of one ampere at 24 volts.

J. PID Control: Provide controllers with proportional, proportional plus integral, and proportional plus integral plus derivative control capability. Terminal controllers are not required to have the derivative component.

K. Digital Controller Networking Capabilities: The upper level digital controllers shall be capable of being networked with other similar upper level controllers. Upper level controllers shall also be capable of communicating over a network between buildings.

L. Communications Ports:

1. Controller-to-controller LAN communications ports: Controllers in the building DDC system shall be connected in a communications network. Controllers shall have controller-to-controller communication ports to both peer controllers (lower level controller). Network may consist of more than one level of local area network and one level may have multiple drops. Communications network shall permit sharing between controllers of sensor and control information, thereby allowing execution of dynamic control strategies and coordinated response to alarm conditions.

2. On-site interface ports: Provide a RS-232, RS-485, or RJ-11, or RJ-45 communications port for each digital controller that allows direct connection of a computer or hand held terminal and through which the controller may be

fully interrogated. Controller access shall not be limited to access through another controller. On-site interface communication ports shall be in addition to the communications port(s) supporting controller-to-controller communications. Communication rate shall be 56K Baud minimum. Every controller on the highest level LAN shall have a communications port supporting direct connection of a computer; a hand held terminal port is not sufficient. By connecting a computer to this port, every controller in the direct digital control system shall be able to be fully interrogated and programmed. The following operations shall be available: downloading and uploading control programs, modifying programs and program data base, and retrieving or accepting trend reports, status reports, messages, and alarms.

M. Digital Controller Cabinet: Each digital controller cabinet shall protect the controller from dust and be rated NEMA 1, unless specified otherwise. Controller cabinets or enclosures the controller is mounted in shall be provided with a lock.

N. Main Power Switch: Each controller on the highest level LAN shall have a main power switch for isolation of the controller from AC power. The switch shall be protected from tampering within the DDC cabinet.

2.04 TERMINAL CONTROL UNITS

A. TCU's shall be manufactured by the same company as the digital controllers.

B. TCU's shall automatically start-up on return of power after a failure, and previous operating parameters shall exist or shall be automatically downloaded from a digital controller on a higher level LAN.

C. TCU's do not require an internal clock if they get time information from the digital controller.

2.05 DDC SOFTWARE

A. DDC software resides in the digital controllers and performs control sequences.

B. Sequence of Control: Provide, in the digital controllers, software to execute the sequence of control. Provide sequences of control written in text format.

C. Database Modification: Provide software to modify the control program database. Database modification shall be accomplished through connected computer or hand held terminal or through a keypad integral to the controller. Database

modification shall be accomplished without having to make changes directly in line-by-line programming. As a result of this requirement, when the control program is of the line-by-line type, database parameters in the following list that take real number values shall require assignment of variable names so parameters can be changed without modifying the line-by-line programming. Alternatively, block programming languages shall provide for modification of these database parameters in fill-in-the-blank screens. The following shall be modifiable in this way:

1. Set points
2. Deadband limits and spans
3. Reset schedules
4. Switchover points
5. PID gains and time between control output changes
6. Time
7. Timed local override time
8. Occupancy schedules
9. Holidays
10. Alarm points, alarm limits, and alarm messages
11. Point definition database
12. Point enable, disable, and override
13. Trend points, trend intervals, trend reports
14. Analog input default values
15. Passwords
16. Communications parameters including network and telephone communications setups

D. Differential: Where equipment is started and stopped or opened and closed in response to some analog input such as temperature, pressure, or humidity, include a differential for the control loop to prevent short cycling of equipment.

E. Motor and Flow Status Delay: Provide an adjustable delay between when a motor is commanded on or off and when the control program looks to the motor or flow status input for confirmation of successful execution of the command.

F. Runtime Accumulation: Provide resettable run time accumulation for each controlled electrical motor.

G. Timed Local Override: Provide user definable adjustable run time for each push of a momentary contact timed local override. Pushes shall be cumulative with each push designating the same length of time. Provide a user definable limit on the number of contact closures summed, such as 6, before the contact closures are ignored. Timed local overrides are to be disabled during occupancy periods.

H. Time Programs: Provide programs to automatically adjust for leap years, and make daylight savings time and standard time adjustments.

I. Scheduling:

   1. Each control output point shall be schedulable and its operation based on time of day, day of week, and day of year. Output points may be associated into groups. Each group may be associated with a different schedule. Changing the schedule of a group shall change the schedule of each point in the group. Points may be added to and deleted from groups. Groups may be created and deleted by the operator.

   2. Provide capability that will allow current schedules to be viewed and modified in a 7-day week format. When control program does not automatically compute holidays, provide capability to allow holiday schedules to be entered one full year at a time.

J. Point Override: I/O and virtual points shall be able to be software overridden in the software and commanded to any possible value from the main building digital controller.

K. Alarming: I/O points and virtual points shall be alarmable. Alarms may be enabled and disabled for every point. Alarm limits shall be adjustable on analog points. Controllers connected to an external communications device such as a printer, terminal, or computer, shall download alarm and alarm message when alarm occurs. Otherwise alarms will be stored and automatically downloaded

when a communications link occurs. The following conditions shall generate alarms:

1. Motor is commanded on or off but the motor status input indicates no change.
2. Room temperature, humidity, or pressure strays outside selectable limits.
3. An analog input takes a value indicating sensor failure.
4. A module is “dead” to the LAN.
5. A power outage occurs.

L. Messages: Messages shall be operator defined and assigned to alarm points. Messages shall be displayed when a point goes into alarm.

M. Trending: DDC system shall have the capability to trend I/O and virtual points. Points may by associated into groups. A trend report may be set up for each group. The period between logging consecutive trend values shall range from one minute to 60 minutes at a minimum. Trend data type shall be selectable as either average over the logging period or instantaneous values at the time of logging. The minimum number of consecutive trend values stored at one time shall be 30 per variable. When trend memory is full, the most recent data shall overwrite the oldest data. Trend data shall be capable of being uploaded to computer. Trend data shall be available on a real time basis; trend data shall appear either numerically or graphically on a connected computer's screen as the data being processed from the DDC system data environment. Trend reports shall be capable of being uploaded to computer disc and archived.

N. Status Display: Current status of I/O and virtual points shall be displayed on command. Points shall be associated into functional groups, such as all the I/O and virtual points associated with control of a single air handling unit, and displayed as a group, so the status of a single mechanical system can be readily checked. A group shall be selectable from a menu of groups having meaningful names; such as AHU-4, Second Floor, Chiller System, and other such names.

O. Diagnostics: Each controller shall perform self-diagnostic routines and provide messages to an operator when errors are detected. DDC system shall be capable of recognizing a non-responsive module on a LAN. The remaining, responsive modules on a LAN shall not operate in a degraded mode.

P. Power Loss: In event of a power outage, each controller shall assume a disabled status and outputs shall go to a user definable state. Upon restoration of power, DDC system shall perform an orderly restart, with sequencing of outputs.

Q. Program Transfer: Provide software for download of control programs and database from a computer to controllers and upload of same to computer from controllers. Every digital controller in the DDC system shall be capable of being downloaded and uploaded to through a single controller on the highest level LAN.

R. Password Protection: Provide at least 3 levels of password protection to the DDC system permitting different levels of access to the system.

S. Energy Data Recording: Provide a resettable signal accumulation for each meter at the main building digital controller.

1. Calculate chilled water thermal energy in BTU/HR using chilled water supply temperature and flow and chilled water return temperature signals.

2. Record electrical energy in KWH and electrical demand in KW.

2.06 SENSORS AND INPUT HARDWARE

A. Field Installed Temperature Sensors:

1. Thermistors: Precision thermistors may be used in temperature sensing applications below 200ºF. Sensor accuracy over the application range shall be 0.36ºF or less between the ranges of 32ºF to 150ºF. Sensor manufacturer shall utilize 100% screening to verify accuracy. Thermistors shall be pre-aged, and inherently stable. Stability error of the thermistor over 5 years shall not exceed 0.25ºF cumulative. Sensor element and leads shall be encapsulated. Bead thermistors are not allowed. A/D conversion resolution error shall be kept to 0.1ºF. Total error for a thermistor circuit shall not exceed 0.5ºF, which includes sensor error and digital controller A/D conversion resolution error. Provide thermistor and digital controller manufacturer documentation and the Contractor's engineering calculations, which support the proposed thermistor input circuit, will have a total error of 0.5ºF or less. Provide 18-gauge twisted and shielded cable for thermistors.

2. Resistance temperature detectors (RTDs): Provide RTD sensors with 1000

ohms, or higher, platinum element which are compatible with digital controllers. Sensors shall be encapsulated in epoxy, series 300 stainless steel, anodized aluminum, or copper. Temperature sensor accuracy shall be 0.1% (one ohm) of expected ohms (1000 ohms) at 32ºF. Temperature sensor stability error over 5 years shall not exceed 0.25ºF cumulative. Direct connection of RTDs to digital controllers, without transmitters, is preferred provided controller supports direct connection of RTDs. When RTDs are connected directly to the controller, keep lead resistance error to 0.25ºF or less. Provide 3-wire sensing circuits to not exceed the 0.25ºF lead resistance error. Total error for an RTD circuit shall not exceed 0.5ºF, which includes sensor error, lead resistance error or 4 to 20 mA transmitter error, and A/D conversion resolution error. Provide manufacturer documentation and the Contractor's engineering calculations which support the proposed RTD circuit will have a total error of 0.5ºF or less for the specified application.

a. Wiring: Provide 18-gauge twisted and shielded pair cable for direct connected RTDs. Provide 18-gauge twisted and shielded pair cable for RTDs using 4 to 20 mA transmitters.

b. Transmitters: Provide 4 to 20 mA transmitters for RTDs where digital controllers do not support direct connection of RTDs to controllers; digital controllers do not meet temperature resolution requirement of 0.5ºF.

3. Temperature sensor details:

a. Room: Conceal element behind protective cover matched to the room interior. Room temperature sensor shall have integral pushbutton, digital input to the controller for system override, and a set point adjustment, analog input to the controller. Digital sensors that communicate directly with the terminal control unit are acceptable. Provide a connection to allow interrogation of the digital controller.

b. Duct averaging type: Continuous averaging RTDs for ductwork applications shall be one foot in length for each 4 square feet of ductwork cross-sectional area with a minimum length of 6 feet. Probe type duct sensors of one-foot length minimum are acceptable in ducts 12 feet square and less.

c. Immersion type: Shall be 3 inches and 6 inches where needed total immersion for use with sensor wells, unless otherwise indicated.

d. Sensor wells: Brass materials; provide thermal transmission material compatible with the immersion sensor. Provide heat-sensitive transfer agent between exterior sensor surface and interior well surface.

e. Outside air type: Provide element on the buildings north side with sunshade to minimize solar effects. Mount element at least 3 inches from building outside wall. Sunshade shall not inhibit the flow of ambient air across the sensing element. Shade shall protect sensing element from rain.

B. Transmitters:

1. Transmitters shall have 4 to 20 mA, or 0-10 VDC output linearly scaled to the temperature, pressure, humidity, or flow range being sensed. Transmitter shall be matched to the sensor, factory calibrated, and sealed. Total error shall not exceed 0.1% of 20 mA (0.02 mA) at any point across the 4 to 20 mA span. Supply voltage shall be 24 volts ac or dc. Transmitters shall have non-interactive offset and span adjustments. For temperature sensing, transmitter stability shall not exceed 0.05ºF a year.

2. Spans and ranges: Transmitter spans or ranges shall be the following and shall be suitable for the application:

a. Temperature:

i. 50ºF span: Room, chilled water, cooling coil, discharge air, return air sensors

ii. 100ºF span: Outside air, hot water, heating coil discharge air, mixed air sensors

iii. 200ºF span: High temperature hot water, heating hot water, chilled/hot water system sensors

b. Pressure:

i. 0 to 100 psi differential: Water differential range

ii. 0 to 5 inches water differential range: Duct static pressure

C. Pressure Transmitters: Provide integral pressure transducer and transmitter. Output of pressure instrument shall be a 4 to 20 mA or 0 to 10 VDC signal proportional to the pressure span. Span shall be as specified. Accuracy shall be 1.0%. Linearity shall be 0.1%. Supply voltage shall be 24 VDC. Transmitter shall meet specified requirements.

D. Current Transducers: Provide current transducers to monitor amperage of motors. Select current transducer range for normal amperage to be above 50% of the range. Current transducers shall have an accuracy of 1% and a 4 to 20 mA output signal.

E. Input Switches:

1. Differential static pressure switch: Provide diaphragm type differential static pressure switches for binary (2 position) operation as specified in sequence of operation. Devices shall withstand pressure surges up to 150% of rated pressure. Contacts shall be single pole double throw and switch may be wired for normally open or normally closed operation. Trip set point shall be adjustable. Pressure switch shall be sized so that operating pressure trip point is approximately midpoint of pressure switch adjustable range. Repetitive accuracy shall be 2%.

2. Induced current operated solid-state switches: Provide adjustable ranging to monitor continuous loads up to 200 amperes. Switch shall indicate whether it is normally open or normally closed. Limit off-state leakage to 2 mA or less.

3. Timed local override: Provide momentary contact push button override with override time set in controller software. Provide to override DDC time of day program and activate occupancy program for assigned units. Upon expiration of override time, the control system shall return to time-of-day program. Time interval for the length of operation shall be software adjustable and shall expire unless reset.

2.07 OUTPUT HARDWARE

A. Valves:

1. Valve assembly: Valves shall have stainless steel stems. Valve bodies shall be designed for not less than 125 psig working pressure or 150% of the

system operating pressure, whichever is greater. Valve leakage rating shall be 0.01% of rated Cv. Class 125 copper alloy valve bodies and Class 150 steel or stainless-steel valves shall conform to ASME/ANSI B16.5 as a minimum. Cast iron valve components shall conform to ASTM A 126 Class B or C as a minimum.

2. Three-way valves: Three-way valves shall have equal percentage characteristics.

3. Valves for chilled water service: Bodies for valves 1-1/2" and smaller shall be brass or bronze, with threaded or union ends. Bodies for valves from 2 inches to 3 inches inclusive shall be of brass, bronze or iron. Bodies for 2-inch valves shall have threaded ends. Bodies for valves from 2 1/2 to 3 inches shall have flanged-end connections. Internal valve trim shall be brass or bronze except that valve stems may be Type 316 stainless steel. Water valves shall be sized for a 3 psi differential through the valve at rated flow, except as indicated otherwise. Select valve flow coefficient (Cv) for an actual pressure drop not less than 50% or greater than 125% of the design pressure drop at design flow. Valves 4 inches and larger shall be butterfly valves.

B. Actuator:

1. Provide electric type with spring return so that, in the event of power failure, actuators shall fail safe in either the normally open or normally closed position as specified. Actuators shall be quiet operating and function properly within the range of 85% to 110% of the motive power. Provide a minimum of one actuator for each damper. Provide actuators of NEMA 3R construction for outdoor service.

2. Electric actuators: Provide direct drive electric actuators for all damper control applications. When operated at rated voltage, each operator shall be capable of delivering the torque required for continuous uniform movement of the valve or damper and shall have end switch to limit travel or shall withstand continuous stalling without damage. Operators shall function properly with range of 85% to 110% of line voltage. Provide gears of steel or copper alloy. Fiber or reinforced nylon gears may be used for torques less than 16-inch pounds. Provide hardened steel running shafts in sleeve bearing of copper

alloy, hardened steel, nylon, or ball bearing. Provide two-position operators of the single direction, spring return, or reversing type. Provide proportioning operators capable of stopping at all points in the cycle and starting in either direction, from any point. Provide reversing and proportioning operators with limit switches to limit travel in either direction unless operator is stall type. Equip valve operators with a force limiting device such as spring yield so that, when in a relaxed position, device shall maintain a pressure on valve disc equivalent to system pressure at valve. Provide reversible shaded pole, split capacitor, synchronous, or stepped type electric motors. Provide actuators of NEMA 3R construction for outdoor service.

C. Output Switches: Control Relays: Shall be double pole, double throw (DPDT), UL listed, with contacts rated to the application, and enclosed in a dustproof enclosure. Equip with a light indicator, which is lit when coil is energized and is off when coil is not energized. Relays shall be socket type, plug into a fixed base, and be replaceable without need of tools or removing wiring.

2.08 ELECTRICAL POWER AND DISTRIBUTION

A. Provide a source 120 volts or less, 60 Hz, 2-pole, 3-wire with ground. Devices shall be UL listed or FM approved.

B. Transformers: Transformers shall conform to UL 506. Power digital controllers on the highest level LAN from dedicated circuit breakers. Transformers for digital controllers serving terminal equipment on lower level LANs shall be fed from the fan motor leads or fed from the nearest distribution panelboard or motor control center, using circuits provided for the purpose. Provide a fuse cutout on the secondary side of the transformer.

C. Surge Protection:

1. Surge and transient protection consist of devices installed externally to digital controllers.

2. Power line surge protection: Surge suppressors external to digital controller, shall be installed on all incoming AC power. Surge suppressor shall be rated by UL 1449, and have clamping voltage ratings below the following levels:

a. Normal mode (line to neutral): Shall be 350 volts

b. Common mode (line to ground): Shall be 350 volts

c. Telephone and communication line surge protection: Protected from surges. Metal oxide varistor (MOV) protection, rated for the application, shall be installed at the equipment. Additional protection, gas tubes rated for the application, shall be installed within 3 feet of the building cable entrance or within 3 feet of the telephone company's network interface.

d. Sensor and control wiring surge protection: Controllers shall have sensor and control wiring surge protection with optical isolation, metal oxide varistors (MOV), or silicon avalanche devices. Fuses are not permitted for surge protection.

D. Wiring: Provide complete electric wiring for DDC system, including wiring to transformer primaries. Control circuit conductors, which run in the same conduit as power circuit conductors, shall have the same insulation level as power circuit conductors. Circuits operating at more than 100 volts shall be in accordance with Division 16 – ELECTRICAL. Circuits operating at 100 volts or less shall be defined as low voltage and shall be run in rigid or flexible conduit, metallic tubing, metal raceways or wire trays, armored cable, or multi-conductor cable. Use multi-conductor cable for concealed accessible locations only. Provide circuit and wiring protection as required by NFPA 70. Aluminum-sheathed cable or aluminum conduit may be used but shall not be buried in concrete. Wiring in HVAC plenums shall be in conduit. Protect exposed wiring from abuse and damage.

1. AC control wiring: Control wiring for 24 volt circuits shall be insulated copper 18 AWG minimum and shall be rated for 300 VAC service. Wiring for 120 volt shall be 14 AWG minimum and shall be rated for 600 VAC service.

2. Analog signal wiring: Analog signal wiring for analog inputs and analog outputs shall be 18 AWG single or multiple twisted pair. Each cable shall be 100% shielded, and have 20 AWG drain wire. Exception is direct connect RTD wiring which shall be single 18 AWG minimum twisted pair, 100% shielded, and with 20 AWG drain wire. Each wire shall have insulation rated to 300 VAC. Cables shall have an overall aluminum-polyester or tinned-copper (cable-shield tape), overall 20 AWG tinned copper cable drain wire,

and overall cable insulation rated to 300 VAC. Install analog signal wiring in conduit separate from AC power circuits.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Perform installation under supervision of competent technicians regularly employed in the installation of DDC systems. Provide components for a complete and operational system.

B. Wiring Criteria:

1. Input/output identification: Permanently label each field wire, cable, or pneumatic tube at each end with unique identification.

2. Rigid or flexible conduit shall be terminated at all sensors and output devices.

3. Surge protection: Install surge protection no more than 3 feet from where communication cable enters building.

4. Grounding: Ground controllers and cabinets to a good earth ground. Ground controller to a ground in accordance with Division 16 – ELECTRICAL. Grounding of the green ac ground wire, at the breaker panel, alone is not adequate. Run metal conduit from controller panels to adequate building grounds. Ground sensor drain wire shields at controller end.

5. Contractor is responsible for correcting all associated ground loop problems.

C. Digital Controllers:

1. Do not divide control of a single mechanical system such as an air handling unit, boiler, chiller, or terminal equipment between 2 or more controllers. A single controller shall manage control functions for a single mechanical system. It is permissible, however, to manage more than one mechanical system with a single controller.

2. Provide digital control cabinets that protect digital controller electronics from dust, at locations shown on the drawings.

3. Provide a main power switch at each highest level LAN digital controller within controller cabinet.

4. No multiplexing of points is allowed.

D. Temperature Sensors: Provide temperature sensors in locations to sense the appropriate condition. Provide sensor where they are easy to access and service without special tools. Calibrate sensors to accuracy specified. In no case will sensors designed for one application be installed for another application.

1. Duct temperature sensors:

a. Provide sensors in ductwork in general locations as indicated. Select specific sensor location within duct to accurately sense appropriate air temperatures. Do not locate sensors in dead air spaces or positions obstructed by ducts or equipment. Install gaskets between the sensor housing and duct wall. Seal duct and insulation penetrations.

b. String duct averaging sensors between 2 rigid supports in a serpentine position to sense average conditions. Thermally isolate temperature sensing elements from supports. Provide duct access doors to averaging sensors.

2. Immersion temperature sensors: Provide thermowells for sensors measuring temperature in liquid applications or pressure vessels. Locate wells to sense continuous flow conditions. Do not install wells using extension couplings. Where piping diameters are smaller than the length of the wells, provide wells in piping at elbows to effect proper flow across entire area of well. Wells shall not restrict flow area to less than 70% of pipe area. Increase piping size as required to avoid restriction. Provide thermowells with thermal transmission material within the well to speed the response of temperature measurement. Provide wells with sealing nuts to contain the thermal transmission material.

3. Outside air temperature sensors: Provide outside air temperature sensors on north side of the building, away from exhaust hoods, air intakes and other areas that may affect temperature readings. Provide sunshields to protect outside air sensor from direct sunlight.

E. Damper Actuators: Actuators shall not be mounted in the air stream.

F. Thermometers: Provide thermometers at locations indicated. Mount thermometers to allow readability when standing on the floor.

G. Pressure Sensors and Differential Pressure:

1. General: Install pressure sensing tips in locations to sense appropriate pressure conditions.

2. Duct static pressure sensing: Locate duct static pressure tip approximately two-thirds of distance from supply fan to end of duct with the greatest pressure drop.

3. Pump proof of flow with differential pressure switches: Install high pressure side between pump discharge and check valve.

H. Control Drawings: Post laminated copies of as-built control system drawings in each mechanical room. Provide 6 sets of as-built drawings to the activity.

3.02 ADJUSTMENTS

A. Calibrate instrumentation and controls and verify the specified accuracy using test equipment with a test equipment accuracy. Adjust controls and equipment to maintain conditions indicated, to perform functions indicated, and to operate in the sequence specified.

3.03 FIELD QUALITY CONTROL

A. General:

1. Demonstrate compliance of the heating, ventilation, and air conditioning control system with the contract documents. Furnish personnel, equipment, instrumentation, and supplies necessary to perform calibration and site testing. Ensure that tests are performed by competent employees of the DDC System Installer or the DDC system manufacturer regularly employed in the testing and calibration of DDC systems.

2. Testing will include the field tests and the performance verification tests. Field tests shall demonstrate proper calibration of input and output devices, and the operation of specific equipment. Performance verification test shall ensure proper execution of the sequence of operation and proper tuning of control loops.

3. Obtain approval of the plan for each phase of testing before beginning that phase of testing. Give to the WHFD AND/OR PROJECT MANAGER written

notification of planned testing at least 45 days prior to test. Notification shall be accompanied by the proposed test procedures. In no case will the Contractor be allowed to start testing without written approval of test procedures. The test procedures shall consist of detailed instructions for complete testing to prove performance of the heating, ventilating and air conditioning system and digital control system.

4. Before scheduling the performance verification test, furnish the field test documentation and written certification to the WHFD AND/OR PROJECT MANAGER that the installed system has been calibrated, tested, and is ready for the performance verification test. Do not start the performance verification test prior to receiving written permission from the WHFD AND/OR PROJECT MANAGER.

3.04 TRAINING

A. See requirements in Section 15000 – General Mechanical Requirements for field instruction of direct digital control system. The Controls Contractor shall provide the following training services:

1. One day of on-site orientation by a Controls Contractor's Field Engineer who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the control system software layout and naming conventions, and a walk through of the facility to identify panel and device locations.

2. General: Provide training course schedule, syllabus, and training materials 5 days prior to the start of training. Conduct training courses for designated personnel in the maintenance and operation of the HVAC and DDC system. Orient training to the specific system being installed under this contract. Use operation and maintenance manual as the primary instructional aid. Operation and maintenance manuals shall be provided for each trainee with 4 additional sets, 2 sets delivered for archiving at the project site, one set for the Mechanical Contractor, and one set for the WHFD AND/OR PROJECT MANAGER. Training manuals shall include an agenda, defined objectives and a detailed description of the subject matter for each lesson. Furnish audio-visual equipment and all other training materials and supplies. A

training day is defined as 8 hours of classroom or lab instruction, including two 15-minute breaks and excluding lunch time, Monday thru Friday, during the daytime shift in effect at the training facility. For guidance, assume the attendees will have a high school education and are familiar with HVAC systems. The minimum amount of training for this project shall be one day.

3. Operator training: Operator training shall include the detailed review of the control installation drawings, points list, and equipment list. The instructor shall then walk through the building identifying the location of the control devices installed. For each type of systems, the instructor shall demonstrate how the system accomplishes the sequence of operation. From the workstation, the operator shall demonstrate the software features of the system. As a minimum, the operator demonstrates and explain logging on, setting passwords, setting up a schedule, trend, point history, alarm, and archiving the database.

4. Maintenance training: The system maintenance course shall be taught at the project site within one month after the completion of the operators training. The course shall last for one 8-hour training day. The course shall include answering questions from the last training session, trouble shooting and diagnostics, repair, instructions, preventive maintenance procedures and schedules, and calibration procedures.

3.05 SEQUENCE OF OPERATION

A. Sequence of operations shall be as indicated.

END OF SECTION

SECTION 15950 – HVAC TESTING/ADJUSTING/BALANCING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in DAGS General Conditions.

1.02 WORK DESCRIPTION

A. The work includes testing, adjusting, and balancing (TAB) of new heating, ventilating, and air conditioning (HVAC) air distribution system including equipment, ducts, and piping which are located within, on, under, between, and adjacent to buildings.

B. Test, adjust and balance all air devices shown on drawings, whether new or existing, to airflow values indicated.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Division 15 – Mechanical.

B. Section 15000 – General Mechanical Requirements.

C. Section 15181 – Chilled Water Piping.

D. Section 15720 – Air Handling Units.

E. Section 15810 – Ductwork & Ductwork Accessories.

F. Section 15910 – Direct Digital Control Systems.

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures and Section 15000 – General Mechanical Requirements.

B. Statements:

1. Independent TAB agency personnel qualifications.

2. Design review report.

3. Pre-field TAB engineering report.

4. Advanced notice TAB field work.

5. Check out list.

C. Independent TAB Agency Personnel Qualifications: For agency proposed for approval, submit information certifying that: The TAB agency is a first tier Subcontractor who is not affiliated with any other company participating in work on this contract; the work to be perform by the TAB agency shall be limited to testing, adjusting, and balancing of HVAC air and water systems to satisfy the requirements of this specification section. Submit the following, for the agency, to the WHFD AND/OR PROJECT MANAGER for approval in compliance with paragraph titled “TAB Personnel Qualification Requirements”.

1. Independent AABC or NEBB certified TAB agency:

   a. TAB agency: AABC registration number and expiration date of current certification; or NEBB certification number and expiration date of current certification.

   b. TAB team supervisor: Name and copy of AABC or NEBB TAB supervisor certificate and expiration date of current certification.

   c. TAB team field leader: Name and documented evidence that the team field leader meets the qualification requirements.

   d. TAB team field technicians: Names and documented evidence that each field technician meets the qualification requirements.

   e. Current certificates: Registrations and certifications shall be current, and valid for the duration of this contract. Certifications, which expire prior to completion of the TAB work, shall be renewed in a timely manner so that there is no lapse in registration or certification. TAB agency or TAB team personnel without a current registration or current certification shall not perform TAB work on this contract.

   f. Replacement of TAB team members: Replacement of members may occur if each new member complies with the applicable personnel qualifications and each is approved by the WHFD AND/OR PROJECT MANAGER.

D. Design Review Report: Submit typed report describing omissions and deficiencies in the HVAC system's design that would preclude the TAB team from

accomplishing the duct leakage testing work and the TAB work requirements of this section. Provide a complete explanation including supporting documentation detailing the design deficiency. State that no deficiencies are evident if that is the case.

E. Pre-Field TAB Engineering Report: Submit report containing the following information:

1. Step-by-step TAB procedure:

    a. Strategy: Describe the method of approach to the TAB field work from start to finish. Include in this description a complete methodology for accomplishing the TAB field work session.

    b. Procedural steps: Delineate fully the intended procedural steps to be taken by the TAB field team to accomplish the required TAB work of each air distribution system and each water distribution system. Include intended procedural steps for TAB work for subsystems and system components.

2. Pre-field data: Submit AABC or NEBB or SMACNA HVACTAB data report forms with the following pre-field information filled in:

    a. Design data obtained from system drawings, specifications, and approved submittals.

    b. Notations detailing additional data to be obtained from the contract site by the TAB field team.

    c. Designate the actual data to be measured in the TAB field work.

    d. Provide a list of the types of instruments, and the measuring range of each, which are anticipated to be used for measuring in the TAB field work. By means of a keying scheme, specify on each TAB data report form submitted, which instruments will be used for measuring each item of TAB data. If the selection of which instrument to use is to be made in the field, specify from which instruments the choice will be made. The instrument key number shall be placed in the blank space where the measured data would be entered.

3. Prerequisite HVAC work checkout list: A list of inspections and work items

which are to be completed by the Contractor, and submitted and approved by the WHFD AND/OR PROJECT MANAGER prior to the TAB team coming to the contract site. At a minimum, a list of the applicable inspections and work items listed in the NEBB TABES, Section III, “Preliminary TAB Procedures” under paragraphs entitled “Air Distribution System Inspection” and “Hydronic Distribution System Inspection”. Also, list as prerequisite work items, the deficiencies pointed out by the TAB Subcontractor in his design review report.

F. Advanced Notices: Submit “Advanced Notice for TAB Field Work” in writing.

G. Completed Checkout Lists: Submit “Prerequisite HVAC Work Checkout List” and certify in writing that each item has been checked and is operating as designed.

H. Field Test Reports: Certified TAB report

I. Submit certified reports in the specified format including the above data.

1. Certified TAB reports: Submit Certified TAB Report in the following manner:

a. Report format: Submit the completed pre-field data forms approved in the pre-field TAB Engineering Report completed by TAB field team, reviewed and certified by the TAB supervisor. Bind the report with a waterproof front and back cover. Include a table of contents identifying by page number the location of each report. Report forms and report data shall be typewritten. Handwritten report forms or report data are not acceptable.

b. Temperatures: On each TAB report form reporting TAB work accomplished on HVAC thermal energy transfer equipment, include the indoor and outdoor dry bulb temperature range and indoor and outdoor wet bulb temperature range within which the TAB data was recorded.

c. Instruments: List the types of instruments actually used to measure the tab data. Include in the listing each instrument's unique identification number, calibration date, and calibration expiration date.

d. Certification: Include the typed name of the TAB supervisor and the dated signature of the TAB supervisor.

2. TAB submittal and work schedule: Compliance with the following schedule is the Contractor's responsibility.

3. TAB field work: At a minimum of 30 calendar days prior to start of field check, accomplish TAB field work; submit certified TAB report; and conduct field check.

1.05 REFERENCES

A. Comply with the recommendations and requirements of the codes and Standards listed hereinafter in addition to detailed requirements of this specification. In the event of conflicting requirements, this specification shall prevail.

1. Associated Air Balance Council (AABC):
    a. AABC MN-1 (1989) Testing and Balancing Heating, Ventilating and Air Conditioning Systems
2. American National Standards Institute (ANSI):
    a. ANSI S1.4 (1983; R 1994) Sound Level Meter
    b. ANSI S1.11 (1986; R 1993) Octave - Band and Fractional- Octave -Band Analog and Digital Filters
3. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE):
    a. ASHRAE HA (1999) Handbook, HVAC Applications
4. Cooling Tower Institute (CTI)
    a. CTI ATC-105 (1990) Acceptance Test Code for Water-Cooling Towers
5. National Environmental Balancing Bureau (NEBB):
    a. NEBB CMSV (1993) Calculations and Measurements of Sound and Vibration
    b. NEBB TABES (1991) Testing, Adjusting, Balancing of Environmental Systems
6. Sheet Metal & Air Conditioning Contractors' National Association, Inc. (SMACNA):
    a. SMACNA HVACADLTM (1985) HVAC Air Duct Leakage Test Manual
    b. SMACNA HVACTAB (1993) HVAC Systems Testing, Adjusting and

1.06 QUALITY ASSURANCE

A. Modifications of References: Accomplish work in accordance with referenced publications of AABC or NEBB except as modified by this section. In the references referred to herein, consider the advisory or recommended provisions to be mandatory, as though the word “shall” had been substituted for the words “should” or “could” or “may” wherever they appear. Interpret reference to the “authority having jurisdiction”, the “Administrative Authority”, the “Owner”, or the “Design Engineer” to mean the “WHFD AND/OR PROJECT MANAGER”.

B. TAB Personnel Qualification Requirements:

1. Independent AABC or NEBB certified TAB agency: Provide services of a TAB agency certified by AABC or NEBB to perform and manage TAB work on HVAC air and water systems. This TAB agency shall not be affiliated with any company participating in any other phase of this contract, including design, furnishing equipment or construction.

2. TAB team personnel: The TAB team approved to accomplish work on this contract shall be full-time employees of the TAB agency. No other personnel shall do TAB work on this contract.

   a. TAB team supervisor: Supervisor shall be qualified by AABC or NEBB as a TAB supervisor or a TAB engineer.

   b. TAB team field leader: Leader shall have satisfactorily performed full-time supervision of TAB work in the field for not less than 3 years immediately preceding this contract's bid opening date.

   c. TAB team field technician: Technician shall have satisfactorily assisted a TAB team field leader in performance of TAB work in the field for not less than one year immediately preceding this contract's bid opening date.

3. Responsibilities: The Contractor shall be responsible for ensuring compliance with the requirements of this section. The following delineation of specific work responsibilities is specified to facilitate execution of the various work efforts by personnel from separate organizations. This breakdown of specific duties is specified to facilitate adherence to the schedule.

a. Contractor:

i. TAB personnel: Ensure that the TAB work is accomplished by a group meeting the requirements specified in paragraph entitled “TAB Personnel Qualification Requirements”.

ii. Pre-TAB meeting: Attend the meeting with the TAB supervisor, and ensure that a representative is present for the Sheet Metal Contractor, Mechanical Contractor, Electrical Contractor, and Automatic Temperature Controls Contractor.

iii. HVAC documentation: Furnish one complete set of the following HVAC-related documentation to the TAB agency:

a) Contract drawings and specifications

b) Approved submittal data for equipment

c) Construction work schedule

d) Up-to-date revisions and change orders for the previously listed items

iv. Submittal and work schedules: Ensure that the schedule for submittals and work required by this section are met.

v. Coordination of supporting personnel: Provide the technical personnel, such as factory representatives or HVAC Controls Installer required by the TAB field team to support the TAB field measurement work. Provide equipment mechanics to operate HVAC equipment to enable TAB field team to accomplish the TAB field measurement work. Ensure these support personnel are present at the times required by the TAB team, and cause no delay in the TAB fieldwork. Conversely, ensure that the HVAC Controls Installer has required support from the TAB team field leader to complete the controls check out.

vi. Deficiencies: Ensure that equipment defects, installation deficiencies, and design deficiencies reported by the TAB team field leader are brought to the attention of the WHFD AND/OR PROJECT MANAGER. Ensure that design deficiencies reported by the TAB field leader, or

the TAB team supervisor, are transmitted to the WHFD AND/OR PROJECT MANAGER within 7 calendar days from date of receipt from the TAB agency.

vii. Prerequisite HVAC work: Complete check out and debugging of HVAC equipment, ducts, and controls prior to the TAB engineer arriving at the project site to begin the TAB work. Debugging includes searching for and eliminating malfunctioning elements in the HVAC system installations, and verifying all adjustable devices are functioning as designed. Prior to the TAB field team's arrival, ensure completion of the applicable inspections and work items listed in the TAB team supervisor's pre-field engineering report. List as prerequisite work items, the deficiencies, pointed out by the TAB team supervisor in the design review report. Ensure that the TAB agency gets a copy of the prerequisite HVAC work checklist specified in the paragraph entitled “Submittals”. Do not allow the TAB team to commence TAB fieldwork until all of the following are completed.

a) HVAC system installations are fully complete.

b) HVAC prerequisite checkout work lists have been completed, submitted, and approved.

c) HVAC system filters are clean for TAB fieldwork.

viii. Advance notice: Furnish to the WHFD AND/OR PROJECT MANAGER with advance written notice for each event, the commencement of the fieldwork and for the commencement of the TAB fieldwork.

b. TAB agency: Provide the services of a TAB team, which complies with the requirements of paragraph entitled, “TAB Personnel Qualification Requirements”.

i. TAB team supervisor: Overall management: Supervise and manage the overall TAB team work effort, including preliminary and technical TAB procedures and TAB team field work.

ii. Pre-TAB meeting: Attend meeting with Contractor.

iii. Design review report: Review project specifications and accompanying drawings to verify that the air systems and water systems are designed in such a way that the TAB team field leader can accomplish the work in compliance with the requirements of this section. Verify the presence and location of permanently installed test ports and other devices needed, including gauge cocks, thermometer wells, flow control devices, circuit setters, balancing valves, and manual volume dampers.

iv. Support required: Specify the technical support personnel required from the Contractor other than the TAB agency; such as factory representatives for temperature controls or for complex equipment. Inform the Contractor in writing of the support personnel needed and when they are needed. Furnish the notice as soon as the need is anticipated, either with the design review report or the pre-field engineering report or during the TAB fieldwork.

v. Pre-field engineering report: Utilizing the following HVAC-related documentation; contract drawings and specifications, approved submittal data for equipment, up-to-date revisions and change orders; prepare this report.

vi. Prerequisite HVAC work checklist: Ensure the Contractor gets a copy of this checklist at the same time as the pre-field engineering report is submitted.

vii. Technical assistance for TAB work: Provide immediate technical assistance to the TAB field team for the TAB work.

viii. Certified TAB report: Certify the TAB report. This certification includes the following work:

a) Review: Review the TAB field data report. From this field report, prepare the certified TAB report.

b) Verification: Verify adherence, by the TAB field team, to the TAB plan prescribed by the pre-field engineering report and verify adherence to the procedures specified in this section.

ix. Design deficiencies: Submit in writing as soon as possible, to the Contractor and the WHFD AND/OR PROJECT MANAGER, each design deficiency reported by the TAB field team. Provide, in this submittal, a complete explanation including supporting documentation detailing the deficiency.

x. TAB field check: The TAB team supervisor shall attend and supervise TAB field check.

c. TAB team field leader:

i. Field manager: Manage, in the field, the accomplishment of the work specified in Part 3 – EXECUTION.

ii. Full time: Be present at the contract site when TAB field work is being performed by the TAB team; ensure day-to-day TAB team work accomplishments are in compliance with this section.

iii. Prerequisite HVAC work: Do not bring the TAB team to the contract site until a copy of the prerequisite HVAC Checklist, with all work items certified by the Contractor to be working as designed, reaches the office of the TAB agency.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 TAB PROCEDURES

A. TAB Field Work: Test, adjust, and balance the listed HVAC systems to the state of operation indicated on and specified in the contract design documents. Air systems and water systems shall be proportionately balanced and reported in the certified TAB report. Provide instruments and consumables required to accomplish the TAB work. Conduct TAB work, including sound measurement work, on the listed HVAC systems in conformance with the AABC MN-1, or NEBB TABES, and NEBB CMSV, except as modified by this section:

1. Maintenance and calibration of instruments.

2. Accuracy of measurements.

3. Preliminary procedures: Use the approved pre-field engineering report as instructions and procedures for accomplishing TAB fieldwork. Test ports required for testing by the TAB engineer shall be located in the field by the TAB engineer during TAB fieldwork. It shall be the responsibility of the sheet metal contractor to provide and install test ports as required by the TAB supervisor.

4. Air distribution systems TAB work:

   a. Air handling unit systems including fans, air handling units, fan coil units, coils, ducts, plenums, mixing boxes, variable air volume boxes, and air distribution devices for supply air, return air and outside air.

   b. Ventilating systems including fans, ducts, plenums, roof vents, registers, grilles and louvers for outside air and exhaust air.

5. Air conditioning and general ventilation systems: Air flow rates and water flow rates shall be balanced to within plus or minus 10% of the design values.

3.02 WORKMANSHIP

A. Conduct TAB work on specified HVAC systems until measured parameters are within plus or minus 10 percent of the design values, that is, the values specified or indicated on the contract documents. To minimize the possibilities of noise at the air devices, “coarse” balancing shall be performed at the duct branch and “fine” balancing shall be performed at the face of the air device.

3.03 DATA FROM TAB FIELD WORK

A. After completion of the TAB work, prepare a pre-final TAB report using the reporting forms approved in the pre-field engineering report. Data required by those approved data report forms shall be furnished by the TAB team. Except as approved otherwise in writing by the WHFD AND/OR PROJECT MANAGER, the TAB work and the TAB report shall be considered incomplete until the TAB work is accomplished to within the accuracy range specified in the paragraph titled “Workmanship” of this section. Prepare the report neatly and legibly; the pre-final TAB report shall be the final TAB report minus the TAB supervisor's review and certification. Obtain, at the contract site, the TAB supervisor's review and certification of the TAB report. Verbally notify the WHFD AND/OR PROJECT

MANAGER's TAB representative that the field check of the certified TAB report data can commence; give this verbal notice 48 hours in advance of when the field checking shall commence. Do not schedule field check of the certified TAB report until the specified workmanship requirements have been met or written approval of the deviations from the requirements have been received from the WHFD AND/OR PROJECT MANAGER.

3.04 QUALITY ASSURANCE FOR TAB FIELDWORK

A. Field Check: Test shall be made to demonstrate that capacities and general performance of air and water systems comply with the contract requirements.

1. Recheck: During field check, the Contractor shall recheck, in the presence of the WHFD AND/OR PROJECT MANAGER, random selections of data (water, air quantities, air motion, sound level readings) recorded in the certified report.

2. Areas of recheck: Points and areas of recheck shall be selected by the WHFD AND/OR PROJECT MANAGER.

3. Procedures: Measurement and test procedures shall be the same as approved for work for forming basis of the certified report.

4. Recheck selections: Selections for recheck will not exceed 25% of the total number of reported data entries tabulated in the report.

5. Retests: If random tests reveal a measured quantity, which is out-of-tolerance, the report is subject to disapproval at the WHFD AND/OR PROJECT MANAGER's discretion. In the event the report is disapproved, all systems shall be readjusted and tested, new data recorded, new certified reports submitted, and a new field check conducted at no additional cost to the WHFD AND/OR PROJECT MANAGER.

B. Approval Prerequisite: Compliance with the field checking requirements of this section is a prerequisite to the final approval of the certified TAB report submitted.

3.05 MARKING OF SETTINGS

A. Permanently mark the settings of HVAC adjustment devices including valves, splitters, and dampers so that adjustment can be restored if disturbed at any

time. The permanent markings shall indicate the settings on the adjustment devices that result in the data reported on the submitted certified TAB report.

3.06 MARKING OF TEST PORTS

A. The TAB team shall permanently and legibly mark and identify the location points of the duct test ports. If the ducts have exterior insulation, these markings shall be made on the exterior side of the duct insulation. The location of test ports shall be shown on the as-built mechanical drawings with dimensions given where the test port is covered by exterior insulation.

END OF SECTION

DIVISION 16 – ELECTRICAL

SECTION 16010 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

A. This section specifies the basic requirements for the electrical installations and includes requirements common to more than one section of Division 16. It expands and supplements the requirements specified in sections of Division 1.

B. Standards of the organizations listed below but referred to in the various sections by basic designation only, form a part of this specification to the extent indicated by the reference thereto:

1. American Society for Testing and Materials (ASTM).
2. National Fire Protection Association (NFPA).
3. American National Standards Institute (ANSI).
4. Illuminating Engineering Society (IES).
5. Institute of Electrical and Electronics Engineers (IEEE).
6. Insulated Cable Engineers Association ICEA).
7. National Electrical Manufacturer's Association (NEMA).
8. National Electrical Contractors' Association (NECA).
9. Underwriters' Laboratories, Inc. (UL).
10. Factory Mutual (FM).
11. Federal Specifications (FS).
12. National Electrical Code (NEC) with County of Hawaii Amendments.

13. ANSI TIA/EIA Telecommunication Building Wiring Standards.

C. References shall mean to the latest edition of the standard.

D. Conform to local ordinances and codes.

1.03 QUALITY ASSURANCE

A. Verify final locations for rough ins with field measurements and with the requirements of the actual equipment to be connected. Contractor shall coordinate with the appropriate supplier, vendor, or subcontractor regarding the exact and specific rough-in requirements for equipment actually supplied.

B. Conduits, junction boxes, wireway, etc. required for low voltage/telecommunications, cabling shall be coordinated with telecommunications cabling divisions prior to rough-in.

1.04 ELECTRICAL SUBMITTALS

A. Refer to Division 1 Specifications for submittal requirements.

B. Data shall be submitted at one time in three ring binders and indexed as scheduled below. Partial submittals will not be accepted.

1. 16060 – Grounding and Bonding.
2. 16073 – Hangers and Supports for Electrical Systems.
3. 16075 – Electrical Identification.
4. 16120 – Conductors and Cables.
5. 16130 – Raceways and Boxes.
6. 16140 – Wiring Devices.
7. 16410 – Enclosed Switches.
8. 16442 – Panelboards.
9. 16511 – Interior Lighting.
10. 16700 – Communications.
11. 16721 – Fire Alarm System.
12. 16762 – Nurse Call System.

C. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.

D. Identify products requiring color selections.

E. Identify products for use on project.

1.05 RECORD DOCUMENTS

A. Refer to the Division 1 Specifications for requirements. The following paragraphs supplement the requirements of Division 1.

B. Mark drawings to indicate revisions to conduit size and location both exterior and interior, actual equipment locations, dimensioned to column lines; concealed equipment, dimensioned to column lines; distribution and branch electrical circuitry; fuse and circuit breaker size and arrangement support and hanger details; Change Orders; Addendums; concealed control system devices.

C. Mark specifications to indicate approved substitutions; Change Orders; Addendums and equipment and materials used.

1.06 WARRANTIES

A. Refer to the Division 1 Specifications for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.

B. Compile and assemble the warranties specified in Division 16, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses and telephone numbers and procedures for filing a claim and obtaining warranty services.

PART 2 - PRODUCTS

2.01 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Substitutions shall be made in accordance with Division 1 Specifications.

2.02 PRODUCT LISTING

A. Prepare listing of major electrical equipment and materials for the project.

B. Submit this listing as a part of the submittal requirement specified in the Division 1 Specifications.

2.03 NAMEPLATE DATA

A. Provide permanent operational data nameplate on each item of power operated equipment, indicating, manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, compliance labels and similar information needed for distinct identification; adequately packaged and protected to prevent damage during shipment, storage and handling.

B. Store equipment and materials at the site unless off-site storage is authorized in writing. Contractor shall protect stored equipment and materials from damage and theft.

C. Coordinate deliveries of electrical materials and equipment to minimize construction congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

3.02 ELECTRICAL INSTALLATIONS

A. Coordinate electrical equipment and materials installation with other building components.

B. Verify all dimensions by field measurement. Do not scale drawings.

C. Arrange for chases, slots, and openings in other building components to allow for electrical installations.

D. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work.

E. Coordinate the access panel requirements with General Contractor to accommodate the installation of electrical equipment and materials.

F. Where mounting heights are not detailed or dimensioned, install electrical services and overhead equipment to provide the maximum headroom possible.

G. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

H. Coordinate the installation of electrical materials and equipment above ceilings with suspension system, mechanical equipment and systems, and structural components.

I. Contractor shall review Mechanical, Structural, and Architectural drawings prior to bid.

J. Final connections to equipment shall be per manufacturer's approved wiring diagrams, details and instructions. It shall be the Contractor's responsibility to provide materials and equipment compatible with equipment actually supplied.

K. It is the intent of these drawings and specifications to establish a standard of quality.

L. Work shall be performed in a workmanlike manner to the satisfaction of the WHFD AND/OR PROJECT MANAGER.

M. Contractor shall verify and coordinate exact location of equipment to be furnished by others prior to rough-in.

N. Contractor shall be responsible for replacing equipment which is damage due to incorrect field wiring provided under this section or factory wiring in equipment provided under this division.

O. Contractors shall visit site prior to bid and verify that conditions are as indicated. Contractor shall include in his bid, costs required to make his work meet existing conditions.

P. Proposed substitutions of electrical equipment or request for "or equal" or approved equal" listing shall be submitted to the WHFD AND/OR PROJECT MANAGER as specified under Division 1.

Q. Wire termination provisions for panelboards, circuit breakers, safety switches and all other electrical apparatus shall be listed as suitable for 75 degree C.

R. Systems shall be complete, operable and ready for continuous operations. Lights, switches, receptacles, motors, etc., shall be connected and operable.

S. Electrical equipment shall be located to maintain clear and level clearances outlined in NEC 110-26. Panelboards, switchboards, transformers, disconnects, switches, breakers, etc. shall be located to comply with NEC 110-26(a). Where the clearances outlined in NEC 110-26 cannot be obtained, the Contractor shall notify the Engineer prior to performing any rough-in.

T. Maintain separation between telecommunication conduits and electrical feeders, electronic ballasts, transformers, etc. to minimize electromagnetic compatibility issues.

3.03 CLEANING

A. Refer to the Division 1 Specifications for general requirements for final cleaning.

END OF SECTION

SECTION 16047 - ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. The extent of general building demolition work is shown on the drawings. Coordinate the required electrical work with the general demolition.

B. Demolition includes removal and disposal of demolished materials, as shown on drawings and herein specified.

C. Interior demolition includes complete wrecking of interior partitions, work above ceilings, finishes, and structures and removal and disposal of demolished materials, as shown on drawings and herein specified.

D. WHFD AND/ OR PROJECT MANAGER shall have the option of retaining any items removed. The Contractor shall deliver these items to the Hospital's designated storage area. Any items not retained by the Hospital shall be disposed of off-site by the Contractor.

1.03 JOB CONDITIONS

A. Condition of Structures: The Hospital assumes no responsibility for actual condition of structures to be demolished.

B. Conditions of the structure existing at time of inspection for bidding purposes will be maintained by WHFD AND/ OR PROJECT MANAGER in so far as practicable. However, variations within structure may occur by the Hospital's removal and salvage operations prior to start of demolition work. The drawings are schematic and provided as an aid in bidding. The Contractor shall visit the site and determine the actual conditions prior to bidding.

C. Partial Removal: Items of salvageable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as

they are removed. Storage or sale of removed items on site will not be permitted.

D. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, occupied areas, and other adjacent occupied or used facilities.

E. Protections: Ensure safe passage of persons around or through area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

F. Install temporary electrical services, lighting, etc. as required by the WHFD AND/ OR PROJECT MANAGER or authorities having jurisdiction.

G. Damages: Promptly repair damages caused to adjacent facilities by demolition operations at no cost to the Hospital.

H. Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations. Allow no interruption in service unless coordinated with WHFD AND/ OR PROJECT MANAGER at least 24 hours in advance.

I. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

J. Contractor will disconnect and seal utilities serving each structure to be demolished, or interior area to be demolished, prior to start of demolition work.

K. If Contractor is required to disconnect utility services or other services to an occupied area, the Contractor shall provide temporary or alternative service to that area.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 DEMOLITION

A. Remove all branch and feeder conduit and wire back to panelboards, where specified.

B. Where walls, ceilings, or floors are to remain, remove devices and wire. Provide blank cover plate at outlet box.

C. All items shown to remain active shall be furnished with necessary accessible junction boxes and all conduit and wire as required to maintain circuit continuity.

D. All outlet boxes which must be removed due to demolition but which must remain active in order to maintain circuit continuity shall be relocated into ceilings or walls and shall be accessible.

E. All material fixtures and equipment to be reused shall be removed and stored on site. Before reinstallation, all items are to be cleaned, tested, and prepared for re-use. Fixtures shall be re-lamped and new ballasts installed.

3.02 DISPOSAL OF DEMOLISHED MATERIAL

A. General: Remove from site debris, rubbish, and other materials resulting from demolition operations. Apply all fees related to removal and pumping.

B. Remove and dispose of interior demolition debris only.

C. Burning of removed materials from demolished structures will not be permitted on site.

D. Transport materials removed from demolished structures and dispose of offsite.

END OF SECTION

SECTION 16060 - GROUNDING & BONDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.02 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment grounding requirements specified in this section may be supplemented by special requirements of section described in other sections.

B. Related Sections:

1. Section 15405 – Medical Gas Systems.
2. Section 15720 – Air Handling Units.
3. Section 15910 – Direct Digital Control Systems.
4. Section 16140 – Wiring Devices.
5. Section 16410 – Enclosed Switches.
6. Section 16762 – Nurse Call System.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

A. 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.

PART 2 - PRODUCTS

2.01 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Equipment Grounding Conductors: Insulated with green-colored insulation.

2.02 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.

PART 3 - EXECUTION

3.01 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

3.02 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.

C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

3.03 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

   1. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.

C. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

END OF SECTION

SECTION 16073 – HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

B. Related Sections:

1. Section 07841 – Penetration Firestopping.
2. Section 09900 – Painting.
3. Section 16130 – Raceways & Boxes.
4. Section 16511 – Lighting.

1.03 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.04 SUBMITTALS

A. Product Data: For each support device.

1.05 QUALITY ASSURANCE

A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. 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.

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

i. Hilti Inc.

ii. ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

iii. MKT Fastening, LLC.

iv. Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. 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:

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

i. Cooper B-Line, Inc.; a division of Cooper Industries.

ii. Empire Tool and Manufacturing Co., Inc.

iii. Hilti Inc.

iv. ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

v. MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.

5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.

6. Toggle Bolts: All-steel springhead type.

7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.01 APPLICATION

A. Comply with NECA 1, NECA 101 and manufacturer's instructions for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. 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.

D. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports. Do not attach raceway to ceiling support wires or other piping systems.

3.02 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, EMT may be supported by openings through structure members, as permitted in NFPA 70.

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 pre-set concrete inserts or expansion anchors.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners or pre-set concrete inserts on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts, Beam clamps (MSS Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. 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 slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

F. Install surface-mounted cabinets and panelboards with minimum of four anchors.

G. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.

H. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

I. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.

J. Do not use power-actuated anchors.

K. Obtain permission from WHFD AND/OR PROJECT MANAGER before drilling or cutting structural members.

3.03 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 Division 9 painting Sections 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.

3.04 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly.

3.05 DEMOLITION

A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

B. All abandoned wiring shall be removed in its entirety in accordance with the locally amended National Electrical Code, NFPA 70.

C. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

D. Abandoned Work: Cut and remove buried raceway, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

E. Remove demolished material from Project site.

F. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

END OF SECTION

SECTION 16075 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Identification for raceways
2. Identification for conductors.
3. Equipment identification labels.

B. Related Sections:

1. Division 16 – Electrical
2. Section 16120 – Conductors & Cables.
3. Section 16130 – Raceways & Boxes.
4. Section 16140 – Wiring Devices.
5. Section 16410 – Enclosed Switches.

1.03 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.04 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.145.

1.05 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring

diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Color for Printed Legend:

1. Power Circuits: Black letters on an orange field.

2. Legend: Indicate system or service and voltage, if applicable.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.02 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

C. Aluminum Wraparound Marker Labels: Cut from 0.014-inch- (0.35-mm-) thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.

D. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking nylon tie fastener.

2.03 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on black face for normal power. White letters on red face for emergency power. Minimum letter height shall be 3/8 inch (10 mm).

2.04 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength: 50 lb (22.6 kg), minimum.
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: According to color-coding.

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 APPLICATION

A. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits More Than: Identify with orange self-adhesive vinyl label, paint, or self-adhesive vinyl tape applied in bands.

B. Accessible Raceways of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands or paint:

1. Color coding for raceways shall be as follows, verify exact requirements based on existing identification convention present at the facility:

Color Service	Band	Minimum Band Width
Power	Yellow	2”
Emergency Power	Red	2”
Life Safety/Fire Alarm	White	2”

C. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.

D. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.

b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

    a. Panelboards, electrical cabinets, and enclosures.

    b. Access doors and panels for concealed electrical items.

    c. Disconnect switches.

    d. Enclosed circuit breakers.

3.02 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

G. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

    1. Color shall be factory applied or, for sizes larger than No. 10 AWG, field applied.

    2. Colors for 208/120-V Circuits:

        a. Phase A: Black.

        b. Phase B: Red.

c. Phase C: Blue.

d. Neutral: White

e. Ground: Green

3. Colors for 480/277-V Circuits:

a. Phase A: Brown.

b. Phase B: Orange.

c. Phase C: Yellow.

d. Neutral: Gray

e. Ground: Green

4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

END OF SECTION

SECTION 16120 - CONDUCTORS & CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.
3. Sleeves and sleeve seals for cables.

B. Related Sections:

1. Section 08710 – Door Hardware
2. Section 15400 – Plumbing.
3. Section 15405 – Medical Gas Systems.
4. Section 15720 – Air Handling Units.
5. Section 15910 – Direct Digital Control Systems.
6. Section 16073 – Hangers & Supports for Electrical Systems.
7. Section 16075 – Electrical Identification.
8. Section 16130 – Raceways & Boxes.
9. Section 16700 – Communications.
10. Section 16762 – Nurse Call System.

1.03 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

1.05 QUALITY ASSURANCE

A. 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.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70.

B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN XHHW and SO.

2.02 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except as indicated below.

1. Use standard conductors for control circuits.
2. Use conductor not smaller than 14 AWG for control circuits.
3. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet (25 m).
4. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet (160 m).

B. Branch Circuits: Copper. Minimum size #12 AWG; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.02 CONDUCTOR INSULATION APPLICATIONS AND WIRING METHODS

A. Feeders Concealed in Ceilings, Walls, Partitions, below raised floors and Crawlspaces: Type THHN-THWN, single conductors in raceway

3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. 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.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Support cables according to Section 16073 - Hangers and Supports for Electrical Systems."

E. Identify and color-code conductors and cables according to Section 16075 - Electrical Identification.

F. Use no wire smaller than 12 AWG for power and lighting circuits, and no wire smaller than 16 AWG for control wiring.

G. Utilize 10 AWG conductor for 20 ampere, 120 volt branch circuit homeruns longer than 75 feet (23m), and for 20 ampere, 277 volt branch circuit homeruns longer than 200 feet (61m).

3.04 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 and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

3.05 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.06 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

SECTION 16130 – RACEWAYS & BOXES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes raceways, fittings, boxes and enclosures, for electrical wiring.

B. Related Sections:

1. Section 16073 – Hangers & Supports for Electrical Systems.
2. Section 16075 – Electrical Identification.
3. Section 16120 – Conductors & Cables.
4. Section 16700 – Communications.

1.02 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquid tight flexible metal conduit.

E. RGSC: Rigid galvanized steel conduit.

F. RNC: Rigid nonmetallic conduit.

1.03 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members in the paths of conduit groups with common supports.
2. Plumbing items and architectural features in the paths of conduit groups with common supports.

1.04 QUALITY ASSURANCE

A. 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.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT: ANSI C80.3.

D. FMC: Zinc-coated steel.

E. LFMC: Flexible steel conduit with PVC jacket.

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Fittings for EMT: Steel compression type.

2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

G. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.02 METAL WIREWAYS

A. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.

B. Fittings and Accessories: Include 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: Screw-cover type or Flanged-and-gasketed type as required.

D. Finish: Manufacturer's standard enamel finish.

2.03 BOXES

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

D. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

A. Comply with the following indoor applications, 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 Physical Damage: Rigid galvanized steel conduit. Includes raceways in the following locations:
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: Rigid galvanized steel conduit, IMC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

B. Minimum Raceway Size: 3/4-inch (24-mm) trade size for homeruns and conduits below grade or slab on grade.

C. 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.

D. All conduits larger than 1” shall be furnished with grounding type busing with equipment grounding conductor solidly connected at both ends.

3.02 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter. Raceway and boxes located as shown on Drawings, and at other locations where required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway as required to complete wiring system. Sizes shall meet or exceed NEC requirements. Raceway routing is shown for reference only. Route as required for a complete raceway system.

B. 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.

C. Complete raceway installation before starting conductor installation.

D. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run between boxes. Provide no more than the equivalent of two (2) 90 degree bends between boxes.

F. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated except as follows:

1. Any variance shall be obtained from the WHFD AND/ OR PROJECT MANAGER.

G. 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.

H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

I. Install raceway sealing fittings at suitable, approved, and accessible locations 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 at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

J. Route raceways, concealed or exposed parallel and perpendicular to walls and building structural components.

K. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures, maximum 36 inches (915 mm) for connection to equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations.

L. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

M. Cut conduit square using saw or pipecutter; de-burr cut ends.

N. Bring conduit to shoulder of fittings; fasten securely.

O. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

P. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate bends in metal conduit larger than 2-inch (50mm) trade size.

3.03 BOX APPLICATIONS

A. Set wall mounted boxes at elevations to accommodate mounting heights indicated. Comply with ADA requirements.

B. Orient boxes to accommodate wiring devices oriented as specified in Section 16140 – Wiring Devices.

C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150mm) from ceiling access panel or from removable recessed luminaire.

E. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

F. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic and fire rated walls.

G. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

H. Use stamped steel bridges to fasten flush mounting outlet box between studs.

I. Use adjustable steel channel fasteners for hung ceiling outlet box.

J. Do not fasten boxes to ceiling support wires or other piping systems.

K. Support boxes independently of conduit.

L. Use gang box where more than one device is mounted together. Do not use sectional box.

M. Use gang box with plaster right for single device outlets.

N. Do not use boxes smaller than 4-inches square.

3.04 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.05 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

B. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

END OF SECTION

SECTION 16140 - WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Receptacles, receptacles with integral GFCI, hospital grade receptacles and associated device plates.
2. Snap switches.
3. Occupancy Sensors.

B. Related Sections:

1. Section 08710 – Door Hardware
2. Section 15400 – Plumbing.
3. Section 15405 – Medical Gas Systems.
4. Section 15720 – Air Handling Units.
5. Section 15910 – Direct Digital Control System.
6. Division 16 – Electrical.
7. Section 16060 – Grounding & Bonding.
8. Section16075 – Electrical Identification.
9. Section 16762 – Nurse Call System.

1.03 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

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.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498. Provide hospital grade receptacles where indicated on drawings.

2.02 GFCI RECEPTACLES

A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

2.03 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A.

2.04 OCCUPANCY SENSORS

A. Long-Range Wall-Switch Sensors: Dual technology, with both passive-infrared- and ultrasonic-type sensing, 120/277 V, adjustable time delay up to 30 minutes,

110-degree field of view, and a minimum coverage area of 1200 sq. ft. (111 sq. m).

B. Ceiling Mount Sensors:

1. Self adjusting
2. Time setting – Automatic adjustable from 30 sec-30min.
3. Test Mode – 6sec with auto exit programming
4. Coverage from 500 to 2000 sq. ft.
5. Ambient light recognition – prevents turning on when the room is adequately lit by natural light.
6. Light sensor – 20 to 3,000 lux
7. Mounting Height – 8 to 12 ft
8. Warranty – 5 yr

2.05 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Satin-finished stainless steel, 0.04-inch- (1-mm-) thick,

2.06 FINISHES

A. Color: Wiring device catalog numbers in Section Text do not designate device color.

1. Wiring Devices Connected to Normal Power System: As selected by WHFD AND/OR PROJECT MANAGER, unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:

1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.

2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.

4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.

2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.

3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

4. Existing Conductors:

   a. Cut back and pigtail, or replace all damaged conductors.

   b. Straighten conductors that remain and remove corrosion and foreign matter.

   c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.

2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.

3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
10. Mounting heights shall be as follows unless noted:
    a. Receptacles: 18” A.F.F. measured to bottom.
    b. Switches: 44” A.F.F. measured to bottom.

E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.02 IDENTIFICATION

A. Comply with Section16075 – Electrical Identification.

1. Receptacles: Identify panelboard and circuit number from which served on back of device plate.

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Test Instruments: Use instruments that comply with UL 1436.

2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.

2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.

3. Ground Impedance: Values of up to 2 ohms are acceptable.

4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.

5. Using the test plug, verify that the device and its outlet box are securely mounted.

6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION

SECTION 16410 – ENCLOSED SWITCHES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.02 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:

1. Nonfusible switches.

B. Related Sections:

1. Division 16 – Electrical.
2. Section 16060 – Grounding & Bonding.
3. Section 16075 – Electrical Identification.
4. Section 16721 – Fire Alarm Systems.
5. Section 16762 – Nurse Call System.

1.03 DEFINITIONS

A. GD: General duty.

B. GFCI: Ground-fault circuit interrupter.

C. HD: Heavy duty.

D. RMS: Root mean square.

E. SPDT: Single pole, double throw.

1.04 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.

2. Current and voltage ratings.

3. Short-circuit current rating.

4. UL listing for series rating of installed devices.

5. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.05 QUALITY ASSURANCE

A. 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.

B. Comply with NFPA 70.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 140 deg F (60 deg C).

2. Altitude: Not exceeding 2500 feet (above sea level).

1.07 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.01 NONFUSIBLE SWITCHES

A. Nonfusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2.02 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

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

3.02 INSTALLATION

A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated.

C. Comply with mounting and anchoring requirements specified in Section 16073 – Hangers & Supports for Electrical Systems.

D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.03 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 16075 – Electrical Identification.

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Section 16075 – Electrical Identification.

3.04 FIELD QUALITY CONTROL

A. Prepare for acceptance testing as follows:

1. Inspect mechanical and electrical connections.
2. Verify switch and relay type and labeling verification.
3. Verify rating of installed fuses.
4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.

3.05 CLEANING

A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.

B. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION

SECTION 16442 - PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Distribution panelboards.

2. Lighting and appliance branch-circuit panelboards.

B. Related Sections:

1. Division 16 – Electrical.

2. Section 16073 – Hangers & Supports for Electrical Systems.

3. Section 16075 – Electrical Identification.

1.03 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. RFI: Radio-frequency interference.

D. RMS: Root mean square.

E. SPDT: Single pole, double throw.

F. AFCI Arc Fault Circuit Interrupter.

1.04 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Wiring Diagrams: Power, signal, and control wiring.

C. Panelboard Schedules: For installation in panelboards.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not exceeding 140 deg F (60 deg C).

2. Altitude: Not exceeding 2500 feet (above sea level).

1.06 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Enclosures: Flush- and surface-mounted cabinets. NEMA PB 1, Type 1.

1. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

2. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

3. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.

B. Phase and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity or aluminum alloy.

2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

C. Conductor Connectors: Suitable for use with conductor material.

1. Main and Neutral Lugs: Mechanical type.

2. Ground Lugs and Bus Configured Terminators: Compression type.

3. Feed-Through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.02 PANELBOARD SHORT-CIRCUIT RATING

A. Fully rated to interrupt symmetrical short-circuit current available at terminals. The use of series rated devices is not acceptable unless noted otherwise on the drawings.

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.04 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: UL 489, with minimum integrated short circuit rating: 10,000 amperes rms symmetrical for 208 volt panelboards; 14,000 amperes rms symmetrical for 480 volt panelboards, or higher as required to exceed available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.

3. Provide SWD listed breakers for lighting currents and HACE for air conditioning currents.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Section 16073 – Hangers & Supports for Electrical Systems.

C. Mount top of trim 74 inches (1880 mm) above finished floor, unless otherwise indicated.

D. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

E. Install overcurrent protective devices and controllers.

1. Set field-adjustable switches and circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.

H. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.02 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 16075 – Electrical Identification.

B. Create a directory to indicate installed circuit loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.03 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

3.04 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

SECTION 16511 – LIGHTING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. A. As specified in DAGS General Conditions.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.03 SUMMARY

A. This Section includes the following:

1. Interior lighting fixtures, lamps, and ballasts.
2. Lighting fixture supports.

B. Related Sections:

1. Division 16 – Electrical.
2. Section 16073 – Hangers & Support for Electrical Systems.
3. Section 16075 – Electrical Identification.

1.04 DEFINITIONS

A. BF: Ballast factor.

B. CRI: Color-rendering index.

C. CU: Coefficient of utilization.

D. HID: High-intensity discharge.

E. LER: Luminaire efficacy rating.

F. Luminaire: Complete lighting fixture, including ballast housing if provided.

G. RCR: Room cavity ratio.

1.05 SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.

2. Emergency lighting units including battery and charger.

B. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

C. Warranties: Special warranties specified in this Section.

1.06 QUALITY ASSURANCE

A. 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.

B. Comply with NFPA 70.

1.07 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.08 WARRANTY

A. Special Warranty for Drivers: Manufacturer's standard form in which fixture manufacturer agrees to repair or replace drivers that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: The design for each luminaire is based on the product named in the Luminaire Schedule on the Contract Drawings. Subject to compliance with requirements, submit to the Authority a comparable product by one of the other manufacturers specified for review and approval.

2.02 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. LED Light Fixtures:

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

2. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

3. Recessed Luminaires: Comply with NEMA LE 4 for ceiling compatibility for recessed luminaires.

4. CRI of minimum 80. Color Tune-able.

5. Rated lamp life of minimum 50,000 hours.

6. Lamps dimmable from 100 percent to 0 percent of maximum light output.

B. LED Troffers:

1. Housing, LED driver, and LED module shall be products of the same manufacturer.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Stainless Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions.

F. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated.

1. White surfaces: 85 percent.

2. Specular Surfaces: 83 percent.

3. Diffusing Specular Surfaces: 75 percent.

4. Laminated Silver Metallized Film: 90 percent.

2.03 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Section 16073 Hangers & Supports for Electrical Systems for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

3.02 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Verify normal operation of each fixture after installation.

C. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION

SECTION 16700 – COMMUNICATIONS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Division 1 – General Requirements.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including DAGS General Conditions and Division 1 – General Requirements apply to this Section.

1.03 SUMMARY

A. This section includes the horizontal cabling portion of a structured cabling system (SCS):

B. Provide all horizontal cabling, terminating hardware, adapters, and cross-connecting hardware necessary to interconnect all system equipment including equipment.

C. Related Sections:

1. Section 16073 – Hangers & Supports for Electrical Systems.
2. Section 16120 – Conductors & Cables.
3. Section 16130 – Raceways & Boxes.
4. Section 16721 – Fire Alarm Systems.
5. Section 16762 – Nurse Call System.

1.04 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Codes and Standards:

1. ANSI/TIA-568-C Commercial Building Telecommunications Wiring Standard.
2. ANSI/TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces.
3. National Electrical Code (NEC), based upon year approval by local codes or AHJ.
4. Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual (TDMM), current edition.
5. Local, county, state and federal regulations and codes in effect as of date of purchase.

1.05 SUBMITTALS

A. Product Data: For each type of product, include data on features, accessories.

B. Refer to DIVISION 1 Specifications.

C. Storage temperature range: -40°F to 149°F (-40°C to 65°C).

PART 2 - PRODUCTS

2.01 HORIZONTAL CABLING

A. Recognized cabling for providing the signal medium from the work area to the communications room shall include the following:

1. Four-pair Category 6 UTP cable.

B. Category 6 UTP Cable Requirements: High performance Category 6 UTP shall adhere to the following:

1. 23/24 AWG solid bare copper.
2. Cable jacket shall comply with NEC Article 800 for use as a plenum cable and shall be UL and c (UL) Listed Type CMP (communications multipurpose plenum).
3. Cable shall terminate on an eight-pin modular jack at each outlet. All horizontal cabling shall meet or exceed the ANSI/EIA/TIA-568-C.2 Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components.

4. Cables shall be marked as UL verified with a minimum of Category 6 rating.

5. The cable shall support Voice, Analog Base band Video/Audio, Fax, Modem, Switched-56, T-1, ISDN, RS-232, RS-422, RS-485, 10BASE-T Ethernet, Token Ring, 100Mbps TP-PMD, 100BASE-T Ethernet, 155 Mbps ATM, AES/EBU Digital Audio, 270 Mbps Digital Video, 622 Mbps 64-CAP ATM and emerging high-bandwidth applications, including 1 Gbps Ethernet, gigabit ATM, as well as all 77 channels (550 MHz) of analog broadband video.

6. The maximum horizontal cable length for Category 6 copper cable from the termination of the cable in the communications room to the outlet is 295 feet.

7. Cable shall be specified to 250 MHz and shall meet the manufacturer's guaranteed electrical performance and physical specifications.

C. Cabling Method:

1. The Contractor shall:

a. Provide cabling in accessible spaces, cable tray, (surface and/or enclosed raceway), conduits, and/or J-Hook cable support system. Within consoles, racks, cabinets, desks, and counters, in accessible ceilings spaces and in gypsum board partitions where open cable method may be used. Use UL or ETL listed plenum rated cable in all spaces.

b. Conceal raceway and cabling except in unfinished spaces as is practical.

c. Utilize conduits/cable tray as indicated on the drawings.

d. Route data and voice cables separately in a neat and orderly fashion. No cable ties or wraps shall be used to secure the cables in the runway outside of the communications rooms. Hook and loop fasteners shall be used for any final cable securing needed. Fasteners shall be rated for the area they are used in, (Plenum as required).

e. Examine pathway elements intended for cable.

f. Check raceways and other elements for compliance with space allocations, installation tolerances, debris, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Application of Media

1. Horizontal cabling

    a. The Contractor shall:

        i. Install cable using techniques, practices, and methods that are consistent with specified data cabling and the installed components and that ensure specified performance levels of completed and linked signal paths, end to end.

        ii. Install cables in continuous lengths from communications outlet to specified patch panels for data and termination blocks for voice.

        iii. Terminate horizontal voice cables into termination blocks without damaging twisted pairs or jacket.

        iv. Terminate horizontal data cables onto 8P8C modular patch panels without damaging twisted pairs or jacket.

        v. Pull cables in smooth and regular motions using methods that prevent cable kinking.

        vi. If necessary use approved cable pulling lubricant.

        vii. Keep all items protected before and after installation with dust and moisture proof barrier materials/envelopes. If wiring is terminated on patch panels, data, voice jacks prior to painting, carpet installation, and general finish clean up, these jacks shall be placed in a protective envelope to ensure dust, debris, moisture, and other foreign material do not settle onto jacks' contacts. Envelope will be removed on final trim out after other trades have completed their finish work. It shall be the Contractor's responsibility to ensure the integrity of these protective measures throughout the life/installation of the project.

        viii. Do not bind cables tightly together with tie or other wraps. Wraps shall slip loosely around cables. Use Velcro wraps instead of cables ties for all bundling in the communications rooms.

        ix. Pull cables simultaneously if more than one is being installed in the same raceway/pathway.

        x. Use pulling means; including fish tape, cable, rope, and basket weave wire/cable grips that will not damage media or raceway.

xi. Install open cabling parallel and perpendicular to surfaces or structural members following surface contours where possible.

xii. Do not bend cable greater than a bend radius of 1.00 inch.

b. Cable bundles brought into the communications rooms shall be routed and dressed in such a manner that prior to termination the cables are not subject to damage and misuse such as installers walking on the bundles that are lying on the floor. Cable pulling force shall not exceed 25 pounds of pulling tension or cable manufacturer's recommended pulling tensions.

c. When exiting runway and/or conduit via a means to ensure support of the cable, shall thereafter be supported with approved materials, and space supporting hardware to maintain performance characteristics, or as listed below.

E. Separation of Wires and Cabling Installation Practices

1. The Contractor shall:

a. Comply with NEC / TIA rules for separating unshielded copper communication and data-processing equipment cables from potential EMI sources, including electrical power lines and equipment.

b. Maintain a minimum spacing of 18 inches from electrical feeders and/or branch circuit wiring.

c. Maintain a minimum spacing of 12 inches from auxiliary systems cabling.

d. Maintain a 1-inch separation where UTP cables must pass perpendicularly to electrical, plumbing, or other wiring, conduit, or piping systems. Use non-conduit bushings, if necessary to maintain separation, which allow for the addition of a reasonable number of cables in the future.

e. Maintain communications pathways away from electrical apparatus such as motor driven equipment and transformers, minimum separation distance of 10-feet is recommended.

f. Provide all necessary installation materials, hardware, tools and equipment to perform insulation displacement type terminations at all data outlets, patch panels, and voice termination materials.

g. Dress and terminate horizontal cables in consistent consecutive order.

h. Arrange cables on patch panels and voice termination hardware in ascending order of room numbers and outlet numbers within rooms.

i. Provide a 3-foot 6-inch service loop for horizontal cables at I/O's. Locate service loop above or below I/O were vertical cable run transitions to horizontal run.

j. Maintain twists in cable pairs to within .5-inch of termination.

k. Group all specialty cables such as the pay phone cables, elevator line, etc which do not have their own termination hardware, in one group, clearly labeled as to cable number and function, in the last positions on the horizontal cabling blocks in each communications room.

l. Limit cable-bending radius for fiber optic cable to 20 times the cable diameter during installation, and 15 times the cable diameter after installation. Follow manufacturer's requirements for copper cable bending radius.

m. Do not leave cables on the floor unprotected or cable bundles hanging from the ceilings. Coil them up in a temporary manner and protect them from damage.

n. Start numbering at the left of the main door to the room and continue in a clockwise direction around the room.

o. The cables within the room will be terminated starting with the cables located to the left of the main door to the room and continue around the room in a clockwise direction.

2.02 TERMINATION HARDWARE

A. Station Hardware

1. Flush mount jacks shall be mounted in a faceplate with back box.

2. Outlets shall not be mounted on temporary, movable, or removable surfaces, doors, or access hatches without prior Project Coordinator approval.

3. 8P8C Jack Pin Assignments - Pin connections for voice and data information outlets and patch panels shall match T-568B termination standard under the

EIA/TIA 568- A code.

4. Pin assignments at all voice and data panels or connecting blocks shall match pin assignments at the information outlets.
5. Copper patch panels shall be rated to match installed cable plant.
6. Horizontal copper cables shall be terminated in eight position/eight conductor (8P8C) modular patch panels with no distinction between voice and data.
7. All Modular jack panels shall be wired to T-568B unless requested otherwise by Project Coordinator.

B. Work area outlets

1. 8P8C non-keyed modular outlets for applications up to 1 Gbps and ANSI/TIA/EIA-568-C compliant for the specified transmission requirements.
2. Part of the UL LAN Certification and Follow-up Program.
3. Universal eight-position jack pin/pair assignments.
4. Blue in color for data outlets, white in color for voice outlets, orange in color for Wireless Access Point (WAP) outlets, and green in color for Security (CCTV, ACS, IDS) outlets.

C. Outlet Faceplates:

1. Match electrical outlets in color and material type.
2. Four-position with blanks inserted in unused ports.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify the following before proceeding:

1. Conduits, cable trays and pull boxes are properly installed.
2. All high-pair count copper cables are routed properly and attached.
3. All backbone cabling service loops are installed and protected.

3.02 INSTALLATION

A. All installation shall be done in conformance with ANSI/TIA/EIA-568-C standards, BICSI methods, industry standards and manufacturer's installation guidelines.

The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the appropriate guidelines shall require the Contractor to provide in a timely fashion the additional material and labor necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.

B. Cabling between communications rooms and workstation locations shall be made as individual “home runs”. No intermediate punch down blocks or splices may be installed or utilized between the communications rooms and the information outlets at the workstation location.

C. All cable must be handled with care during installation so as not to change performance specifications. Factory twists of each individual pair must be maintained up to the connection points at both ends of the cable. There shall never be more than .5 inches of unsheathed Category 6 UTP cable at either the wiring closet or the workstation termination locations.

D. All cabling and associated hardware shall be placed so as to make efficient use of available space. All cabling and associated hardware shall be placed so as not to impair equipment's efficient use of their full capacity.

E. Exposed Cable

1. All station cabling shall be installed inside walls or ceiling spaces whenever possible.

2. Exposed station cable will only be run where indicated on the drawings and will only be allowed when no other options exist. Project Coordinator must approve all exceptions.

F. All cabling placed above drop ceilings must be supported using J-hooks per EIA/TIA standards.

G. Identification - The Contractor shall:

1. Label cable terminations on designation strips.

2. Label all cable at each terminating point.

3. Label each port of the work area outlet.

4. Cable identification numbers shall not be duplicated.
5. Labeling convention to be coordinated with WHFD AND/ OR PROJECT MANAGER.
6. Label data patch panels and voice blocks in the communications rooms to match those on the corresponding voice and data outlets. The font shall be at least .125-inch in height.
7. All labels shall correspond to as-built drawings and to final test reports.

END OF SECTION

SECTION 16721 - FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. The renovated area requires modifications to the existing fire detection system. Systems shall be in-stalled in accordance with the specifications and drawings. Provide new fire alarm wiring, terminations and devices to connect new devices and locations under this project. Provide all work including additional devices, appliances, control modules, monitor modules, relays, interface devices, expansion modules, annunciators and other components to achieve a complete and operable fire alarm system and sequence of operations which is acceptable and approved by all Authorities Having Jurisdiction. Install new circuits to new fire alarm panel, terminate and program panel for new devices under this project. Extend and integrate the new FACP and devices into the existing fire alarm system as indicated on the drawings.

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto an NFPA Style 7 (Class A) signaling line circuit.

2. A single ground or open on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

3. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

C. Related Sections:

1. Section 16410 – Enclosed Switches.

2. Section 16140 – Wiring Devices.

3. Section 16700 – Communications.

1.02 REQUIREMENTS

A. A fully addressable, intelligent, UL listed fire alarm system in full accordance with Local, State and federal requirements for the use and occupancy indicated in the

Contract Documents whether or not specifically identified herein. New components shall be fully compatible with the existing system.

1.03 DESCRIPTION

A. Furnish and install all conduit, wire, outlet boxes, junction boxes, terminal equipment, and accessories to install a zoned, non-coded continuous ringing, battery standby, supervised fire alarm system. The system shall be UL certified and shall meet requirements of NFPA 72.

B. Include with submittals a bill of material, battery calculations, a list of approved conductors, riser diagram, zone listing, permit review by the authority having jurisdiction, and proof of compliance with the fire alarm installer's license as required. Increase the quantity and power of notification appliances as necessary to comply with the spacing, line of sight and intensity requirements identified by the most stringent of code or of the code officials' requirements.

C. This section includes the furnishing, installation, and connection of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

D. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for protected premises signaling systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors. The system shall be UL Listed for Power Limited Applications per National Electrical Code Art. 760.

E. The new system shall be connected to, and integrated with, the existing Central Monitoring Station. The Contractor prepared shop drawings shall incorporate all code and AHJ requirements whether or not specifically indicated on the drawings.

1.04 BASIC SYSTEM FUNCTIONAL OPERATION

A. When a fire alarm condition is detected and reported by one of the system initialing devices or appliances, the following functions shall immediately occur:

1. The System Alarm LED shall flash.

2. All system output programs assigned via control by event equations to be activated by the particular point in alarm shall be executed, and the associated System Out-puts (alarm indicating appliances and/or relays) shall be activated. All assembly occupancies shall have voice evacuation with intelligible English language directions.

1.05 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittal Procedures.

B. General:

1. Submittals are required for all products in this section in accordance with Section 16010 – Basic Electrical Requirements and Division 01 – General Requirements. In addition to product data and certifications, also submit hourly rate for specified training.

2. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

3. No instructions given in the contract documents shall be construed as an authorization to violate any code, ordinance, regulation or law.

C. Shop Drawings and Diagrams:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications. Data sheets of UL assemblies for all firewall penetrations with complete details of all materials and techniques.

2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, riser diagram, complete wiring diagrams indicating the size, type, and number of cabling and conduit layouts.

3. Equipment layout, including the locations and addresses and model numbers of Fire Alarm Control Panel (FACP), Digital Alarm Communications/ Transmitter (DACT), power supplies and all initiating devices and indicating appliances. Show annunciator layout, configurations, and terminations. The Contract Document form the basis for shop drawings and devices/appliances

indicated may not fulfill all requirements of the code authority requirements. Shop drawings are to indicate additional features as necessary to fulfill all requirements of code authorities as a requirement under the Contract. Provide any additional devices/appliances as directed by any Authority Having Jurisdiction.

D. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance are certified by the equipment manufacturer. Include names and addresses in the certification and a copy of Contractor's Underwriters' Laboratory (UL) Certificate of Compliance.

1.06 GUARANTY

A. Refer to Division 1 – General Requirements.

1.07 APPLICABLE SPECIFICATIONS

A. The specifications, standards and requirements of the governing bodies listed below form a part of this specification. The installed system shall fully comply with the requirements of these standards, codes and governing bodies.

1. National Fire Protection Association (NFPA):

a. No. 5000-2003 Building Construction and Safety Code.

b. No. 70-2002 National Electrical Code (NEC).

c. No. 72-2002 National Fire Alarm Code.

d. No. 101-2003 Life Safety Code.

2. Underwriters Laboratories Inc. (UL):

a. No. 268 Smoke Detectors for Fire Protective Signaling Systems

b. No. 864 Control Units for Fire Protective Signaling Systems

c. No. 268A Smoke Detectors for Duct Applications.

d. No. 521 Heat Detectors for Fire Protective Signaling Systems

e. No. 464 Audible Signaling Appliances.

f. No. 38 Manually Actuated Signaling Boxes.

g. No. 1971 Visual Indicating Appliances.

3. Local and State Building Codes.

4. All requirements of the Authority Having Jurisdiction (AHJ).

1.08 APPROVALS

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

1. Underwriters Laboratories Inc. (UL).

2. Factory Mutual (FM).

3. Each subassembly of the FACP shall carry the appropriate and official UL modular label.

B. The system shall be listed by the national agencies as suitable for extinguishing release applications.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All Equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.02 CONDUIT AND WIRE

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and county requirements.

2. Vertical risers through the building and all wiring in exposed locations shall be in-stalled in raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where 3 or more cables are contained within a single conduit.

3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.

4. Wiring for 24 volt control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the Fire Alarm Control Panel, or any other remotely mounted Control Panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

6. Conduit shall be 1/2 inch (19.1 millimeter) minimum, and shall be supported as required by NEC. All conduit fittings and junction box cover plates shall be painted red.

7. In concealed locations plenum rated cable with red jacketing is allowed. a. Support 5 feet on centers using metal J hooks or bridle rings anchored to the building structure. Do not support J hooks or bridle rings from ceiling support wires. Separate support wires for bridle ring support are required.

B. Wire:

1. All fire alarm system wiring shall be new.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760), as specified in Section 16120 – Conductors & Cables, and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system

manufacturer. Label all conductors using adhesive number labels which correspond with shop drawings. Label at origin, at termination point and at any junction boxes.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wiring used for the multiplex communication loop shall be twisted and shielded and installed in conduit except for the aerial drops. The system shall permit use of IDC and IAC wiring in the same conduit with the communication loop.
5. All field wiring shall be completely supervised.
6. All wiring shall be color coded as follows:
    a. Gray and White: Initiating Circuits
    b. Brown and Orange: Signal Devices
    c. Blue and Yellow: Multiplex Communications

C. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.

2.03 SYSTEM COMPONENTS

A. Fire Alarm Audio/Visual Signaling Device:

1. Electronic Strobe shall operate on 24 VDC nominal, and shall be UL listed for indoor or outdoor use.
2. The Strobe shall meet the following criteria:
    a. The maximum pulse duration shall be 2/10ths of one second.
    b. The intensity shall be a minimum of 75 candela or as indicated/required to meet the scheduled intensity in NFPA 72 for the room size indicated.
    c. The flash rate shall be as required by NFPA 72, ANSI A-117.8 and ADA.
    d. The appliance bottom shall be placed 80-inches above the highest floor level within the space, or its top 6-inches below the ceiling, whichever is the lower.
    e. Shall be flush mounted in general location shown on plans. Surface

mounting may be allowed, if approved by WHFD AND/ OR PROJECT MANAGER, in existing installations with walls that lack interior accessible cavities.

f. Strobe Candela Rating: Determine by positioning selector switch on back of device.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as recommended by the equipment manufacturer in addition to all requirements shown on the drawings. All fire alarm systems junction boxes, located above suspended ceilings, in attics, tunnels and equipment rooms, shall be identified by having their covers painted Red.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Outlet, Junction and Pull Boxes to be a minimum of 4-inches by 4-inches by 2-1/8-inches and shall be mounted to the building structure or surface as in accordance with NEC. The suspended ceiling or its support wires are not recognized, nor accepted as part of the building’s structure

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

D. Wiring shall not share raceways or penetrations with any of the building's electrical, mechanical, communication or control systems. Wiring in exposed areas shall be installed in specified raceways. Use of the existing conduit system is unacceptable, unless stated elsewhere in these documents or attached plans. All interior wiring installed above suspended ceilings may be in code approved plenum type cable as required by code and supported by an approved bridle ring. EMT conduit nipples are required at cable penetrations of all walls and floors slabs. Seal in and around conduits and cabling with an approved smoke/fire

caulk, in full accordance with the manufacturers' recommendations to prevent passage of smoke or fire.

E. Interior runs of cabling shall be supported by B-Line, Catalog Numbers BR-12-T (3/4 inch diameter ring size) through BR-64-4T, (4 inch diameter ring size) bridle rings made of steel rod with Number 10/24 and 1/4 inch threads on the support end, or accepted equivalent. Bridle rings shall be mounted within 18 inch each direction from where the cable enters or exits a raceway and each 5 linear feet along the run of the cable. All cables shall be secured to the 2 immediate bridle rings located at outside corners with a 1/4 inch minimum size code approved cable-tie, leaving adequate slack in the cables to prevent the abrasion of the cables' jacket. The cables shall be pulled tight and secured to a bridle ring each 20 linear feet to prevent excessive sagging of the cables.

F. Alarm Conductor Identification. All cables leaving the Fire Control Panel (FACP) shall be numbered and identified as required by NEC Article 760-10 by the use of 3M ScotchCode STD adhesive numbers or accepted equivalent. These cables shall be identified individually at their origin, at each junction box, termination block and at their termination at the device or appliance. Each cable run shall be numbered consistently throughout each run of cable.

3.02 TEST

A. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.

1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
2. Open initiating device circuits and verify that the trouble signal actuates.
3. Open and short signaling line circuits and verify that the trouble signal actuates.
4. Open and short indicating appliance circuits and verify that trouble signal actuates.
5. Ground all circuits and verify response of trouble signals.
6. Check presence and audibility of tone at all alarm notification devices.

7. Check installation, supervision, and operation of all intelligent smoke detectors using the Walk Test.

8. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

9. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.03 FINAL INSPECTION

A. Prior to requesting a Final Inspection by fire and code officials, the contractor shall accomplish an initial visual inspection and system test in accordance with the NFPA 72. This inspection and test shall be recorded on NFPA Inspection and Testing Form Figure 7.5.2.2. This completed form shall be presented to WHFD AND/ OR PROJECT MANAGER and both state and local fire inspectors prior to their initial inspection of the system.

B. At the final inspection factory trained representatives of the fire alarm contractor shall demonstrate that the systems function properly in every respect. All coordination of code officials, WHFD AND/ OR PROJECT MANAGER, DIVISION 16 - ELECTRICAL contractors, WHFD AND/ OR PROJECT MANAGER officials and WHFD AND/ OR PROJECT MANAGER'S representative is the fire alarm contractor's responsibility. All of these parties shall be represented at the final inspection.

C. The fire alarm contractor shall provide all ladders, canned smoke, test equipment, heat gun, ladders, 2-way radios, sound meters.

D. Furnish as-built copies of the fire alarm system on AutoCAD v2013 and provide sensitivity tests of all smoke detectors. All deficiencies must be corrected prior to acceptance by the WHFD AND/ OR PROJECT MANAGER. Written acceptance of the system by WHFD AND/ OR PROJECT MANAGER, and code officials must be provided before project close-out.

E. Final acceptance of the fire alarm system requires the written approval of the County of Hawaii Fire Department.

3.04 SITE DOCUMENTATION

A. Furnish a complete set of fire alarm manuals and one set of as-built fire alarm plans. Maintain a set of approved prints at the job site exclusively for recording the routing of all cables, conduits and deviations from the approved submittal drawings which are necessary because of job conditions. Mark deviations with *a* RED pencil so that they may be easily identified. All deviations from the approved submittal drawings shall be made a part of the final As-built drawings The as-built plans shall include the location and address of every device and shall indicate the address and type of device. The drawings may be as small as 1/32 inch scale if the text and devices are easily legible. A sample drawing shall be submitted to WHFD AND/ OR PROJECT MANAGER's representative for approval.

END OF SECTION

SECTION 16721 – NURSE CALL SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. This document describes the products and execution requirements relating to Nurse Call System.

B. Nurse Call System shall be UL Listed 1069.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

D. Related Sections:

1. Section 16060 – Grounding & Bonding.
2. Section 16120 – Conductors & Cables.
3. Section 16140 – Wiring Devices.
4. Section 16410 – Enclosed Switches.
5. Section 16700 – Communications.

1.02 SUBMITTALS

A. Provide product data from manufacturers' specifications.

1.03 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the specification or not.

B. Contractor shall subcontract nurse call system and devices with Hill-Rom. Coordinate requirements prior to Bidding.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. Products shall be fully compatible with the hospitals existing system and shall match the type, style and performance requirements of all existing equipment currently in place at the hospital. Provide all devices required for a complete and operable system as specified herein and as identified on plans, including nurse call lights, pull cords, room controllers, code blue stations, and all appurtenances.

B. 12/24 VDC Cable (2-conductor, unshielded, 18 AWG)

   1. Non-Plenum – Belden #5300UE
   2. Plenum – Belden #6300UE
   3. Or Approved Equal

C. 12/24 VDC Cable (2-conductor, unshielded, 16 AWG)

   1. Non-Plenum – Belden #5200UE
   2. Plenum – Belden #6200UE
   3. Or Approved Equal

PART 3 - EXECUTION

3.01 NURSE CALL SYSTEM

A. The nurse call system shall be installed by a qualified contractor as per the requirements specified by the manufacturers' installation guidelines and best industry practice.

B. Provide all necessary interconnections, services, and adjustments required for a complete and operable system.

C. Install control signal, communications, and data transmission line grounding as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

3.02 FIELD QUALITY CONTROL

A. Testing

1. All devices shall be tested for full operational compliance.

2. Testing of system shall be the sole responsibility of the Contractor.

3.03 LABELING

A. Label all cables at each end of each cable. Labels shall be machine generated, wrap-around type.

B. Labeling system shall designate the cable's origin and destination on each end of each distribution/horizontal cable.

3.04 WARRANTY

A. All equipment, components, etc., shall be guaranteed free of defects and any faulty workmanship for a period of one year after final acceptance.

B. The Contractor shall replace defective materials and repair faulty workmanship within 24 hours of discovery at no cost to the Hospital.

END OF SECTION