PROJECT MANUAL

FOR

PET Scan Addition

To

BRCC

5231 Brittany Drive
Baton Rouge, Louisiana

BATON ROUGE CARDIOLOGY CENTER

PROJECT NO. 222706047

February 27, 2024

Stantec

1200 Brickyard Lane, Suite 400 BATON ROUGE, LOUISIANA 70802 225 765 7400

TABLE OF CONTENTS
Additions & Renovations
To

PET Scan Addition To BRCC

5231 Brittany Drive, Baton Rouge, LA

ARCHITECTS AND ENGINEERS	1 only
INSTRUCTIONS TO BIDDERS	1 thru 5
CONSTRUCTION PROPOSAL	CP-1 & CP-2
GENERAL CONDITIONS	1 only
SUPPLEMENTARY CONDITIONS	1 thru 25
CONTRACT FORM	1 only
GENERAL CONTRACT REQUIREMENTS	
Section 01005 - Administrative Provisions	1 thru 5
Section 01045 - Cutting & Patching	1 thru 2
Section 01200 - Project Meetings	1 only
Section 01300 - Submittals	1 thru 2
Section 01400 - Quality Control	1 thru 2
Section 01410 - Testing Laboratory Services	1 only
Section 01500 - Construction Facilities and Temporary Controls	1 thru 3
Section 01600 - Material and Equipment	1 thru 2
Section 01700 - Contract Closeout	1 thru 3
Section 014001 -Site Work Quality Requirements	1 thru 3
Section 015723- Stormwater Pollution Prevention	1 thru 3
Section 017301- Sitework Execution	1 thru 6
DIVISION 2 - SITE WORK	
Section 02072 - Demolition	1 only
Section 02281 - Termite Control	1 thru 3
Section 02300 – Earthwork (Building Pad)	1-11
DIVISION 3 – CONCRETE	
Section 311000- Site clearing	1 thru 3
Section 312000 – Earthwork	1 thru 9
Section 321314 - Cement Concrete Pavement	1 thru 4
Section 321723 – Pavement Markings	1 only
Section 329200- Site Lawns & Grasses	1 thru4
Section 03300 – Cast-In-Place Concrete	1 thru 19
DIVISION 4 - MASONRY	
Section 04100 – Mortar	1 thru 2
Section 04300 – Masonry	1 thru 4
DIVISION 5 - METALS	
Section 05999 - Miscellaneous Metals	1 thru 3

DIVISION 6 - CARPENTRY
Section 06001 - Carpentry 1 thru 7
Section 06100 - Rough Carpentry 1 thru 6
Section 06160 - Sheathing 1 thru 4
Section 06170 - Shop – Fabricated Wood Trusses 1 thru 8
Section 06410 - Laminated Finish Custom Casework 1 thru 5
Section 06650 - Solid Polymer Fabrications 1 thru 5

DIVISION 7 - THERMAL AND MOISTURE PROTECTION
Section 07155 - Dampproofing 1 thru 2
Section 07175 – Water Repellent Coating 1 thru 2
Section 07210 - Building Insulation 1 thru 2
Section 07411 – Metal Roof Panels (Standing Seam Metal Roof) 1 thru 12
Section 07600 - Sheet Metal Flashing 1 thru 5
Section 07605 - Thru-Wall Flashing (Damp Course) 1 only
Section 07951 - Caulking and Sealants 1 thru 4

DIVISION 8 - DOORS AND WINDOWS
Section 08113 - Hollow Metal Doors and Frames 1 thru 10
Section 08210 - Wood Doors 1 thru 3
Section 08305 - Access Panels 1 thru 2
Section 08349 – Radiation Shielding Door & Frames 1 thru 8
Section 08560 – Vinyl Windows 1 thru 6
Section 08712 - Door Hardware 1 thru 15
Section 08800 - Glass & Glazing 1 thru 5

DIVISION 9 - FINISHES
Section 09260 - Gypsum Board Systems 1 thru 3
Section 09511 - Suspended Acoustical Ceilings 1 thru 4
Section 09650 - Resilient Flooring 1 thru 4
Section 09900 - Painting 1 thru 7

DIVISION 10 - SPECIALTIES
Section 10210 - Metal Wall Louvers 1 thru 2
Section 10443 – Aluminum Extrusion Sign with Changeable Insert 1 thru 5
Section 10523 - Fire Extinguishers and Cabinets 1 thru 2

DIVISION 11 - EQUIPMENT
NOT USED

DIVISION 12 - FURNISHINGS
Section 12512 - Shades 1 thru 2

DIVISION 13 - SPECIAL CONSTRUCTION
Section 13090 – Lead Radiation Shielding 1 thru 4

DIVISION 14 - CONVEYING SYSTEM
NOT USED

DIVISION 15 – MECHANICAL

Section 15010 - General Provisions	1 thru 25
Section 15012 - Environmental Control Services	1 thru 2
Section 15055 - Motors	1 thru 10
Section 15060 - Motor Starters	1 thru 6
Section 15140 - Supports and Sleeves	1 thru 11
Section 15172 – Variable Speed Drives	1 thru 10
Section 15183 - Refrigerant Piping	1 thru 4
Section 15190 - Piping and Equipment Identification	1 thru 6
Section 15201 - Vibration Isolation	1 thru 7
Section 15260 - Piping Insulation	1 thru 12
Section 15290 - Ductwork Insulation	1 thru 9
Section 15330 – Wet Pipe Sprinkler System	1 thru 15
Section 15400 - Plumbing Piping	1 thru 18
Section 15430 - Plumbing Specialties	1 thru 11
Section 15440 - Plumbing Fixtures	1 thru 11
Section 15622 - Air Handling Units	1 thru 6
Section 15670 - Condensing Units	1 thru 4
Section 15815 - Ductwork	1thru 15
Section 15820 - Ductwork Accessories	1 thru 7
Section 15900 - Temperature Controls	1 thru 11
Section 15933 – Air Terminal Units	1 thru 8
Section 15936 - Air Outlets and Inlets	1 thru 4
Section 15954 - Testing and Balancing	1 thru 6

DIVISION 16 – ELECTRICAL

Section 16010 - Basic Electrical Requirements	1 thru 8
Section 16045 - Electrical Related Work	1 thru 7
Section 16060 - Demolition	1 thru 2
Section 16111 - Conduit	1 thru 4
Section 16120 - Building Wire and Cable	1 thru 2
Section 16130 - Boxes and Fittings	1 thru 3
Section 16143 - Wiring Devices	1 thru 5
Section 16170 - Circuit & Motor Disconnects	1 thru 2
Section 16195 - Electrical Identification	1 thru 2
Section 16452 - Grounding	1 thru 2
Section 16470 - Panelboards	1 thru 4
Section 16500 - Lighting	1 thru 2
Section 16720 - Fire Alarm Systems	1 thru 4

END OF TABLE OF CONTENTS

ARCHITECTS AND ENGINEERS

Additions & Renovations
To
PET Scan Addition to BRCC

5231 Brittany Drive, Baton Rouge, LA

Stantec Project No. 222706047

Architects

Stantec Architecture Inc
1200 Brickyard Lane, Suite 400
Baton Rouge, LA 70802
Phone: (225) 765-7400

Civil Engineers

Stantec
1200 Brickyard Lane, Suite 400
Baton Rouge, LA 70802
Phone: (225) 765-7400

Structural Engineers

Fox-Nesbitt Engineering, LLC
9100 Bluebonnet Centre Blvd. Suite 301
Baton Rouge, LA 70809

Phone: (225) 293-6595

Mechanical Engineers

Eyre Engineering, LLC
7423 Picardy Ave., Suite E
Baton Rouge, LA 70808

Phone: (225) 767-7070

Electrical Engineers

Ryan Moore Engineering Consultants LLC
18456 Lake Myrtle Dr.
Baton Rouge , LA 70817
Phone: (225) 936-0816

INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINITIONS

The Bidding Documents include the following:

Instructions to Bidders
Proposal Form
General Conditions of the Contract for Construction,
AIA Document 201, Latest Edition
Supplementary Conditions
Specifications, Sections TC through Division 16 dated **February 27, 2024**.
Drawing Sheets: As outlined in Index found on Drawing **Sheet G001**, dated **February 27, 2024.**
Addenda issued during the Bid period and acknowledged in the Proposal Form.

All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

Addenda are written or graphic instructions issued by the Architect prior to the opening of Bids which modify or interpret the Bidding Documents by addition, deletions, clarifications or corrections.

A Bid is a complete and properly signed proposal to do the work or designated portion thereof for the sums stipulated therein, supported by data called for by the Bidding Documents.

Base Bid is the sum stated in the Bid for which the Bidder offers to perform the work described as the base, to which work may be added or deleted for sums stated in Alternate Bids.

An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deleted from the amount of the Base Bid, if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.

A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Contract Documents.

A Bidder is one who submits a Bid for a prime contract with the Owner for the work described in the proposed Contract Documents.

A Sub-Bidder is one who submits a Bid to a Bidder for materials or labor for a portion of the work.

ARTICLE 2 - BIDDER'S REPRESENTATION

Each Bidder by making his Bid represents that:

He has read and understands the Bidding Documents, and his Bid is made in accordance therewith.

He has visited the site and has familiarized himself with the local conditions under which the work is to be performed. This further requires Contractors to raise acoustical ceilings to investigate and familiarize himself with existing conditions concerning all divisions of work including plumbing, mechanical, and electrical.

His Bid is based upon the materials, systems and equipment described in the Bidding Documents, without exceptions.

The Bidder must be fully qualified under any state or local licensing law for Contractors in effect at the time and at the location of the work before submitting his Bid. In the State of Louisiana, only the Bids of Contractors and Sub-Contractors duly licensed under Louisiana Revised Statutes 37:2151, et seq., will be

considered, if applicable. The Contractor shall be responsible for determining that all of his Sub-Bidders or prospective Sub-Contractors are duly licensed.

ARTICLE 3 - BIDDING DOCUMENTS

Copies

Complete Bidding Documents for this project are available in electronic form. They may be obtained without charge from Architect. Printed copies are not available from the Architect but arrangements can be made to obtain them through most reprographic firms and/or plan rooms. Questions about this procedure shall be directed to the Architect at:

Stantec Architecture Inc.
1200 Brickyard Lane, Suite 400
Baton Rouge, Louisiana 70802

Complete sets of Bidding Documents shall be used in preparing Bids; neither the Owner nor the Architect assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

The Owner or Architect, in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids on the work, and do not confer a license or grant for any other use.

Interpretation or Correction of Bidding Documents

Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bidding Documents, or of the site and local conditions.

Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect, to reach him at least ten (10) days prior to the date for receipt of Bids.

Any interpretation, correction or change of the Bidding Documents will be made by addendum. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections and changes.

Substitutions

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

No substitution will be considered unless written request for approval has been submitted by the proposer, and has been received by the Architect at least seven (7) days prior to the date for receipt of Bids. Each such request shall include the name of the material or equipment for which it is to be substituted, and a complete description of the proposed substitute, including drawings, cuts, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require shall be included. The burden of proof of the merit of the proposed substitute is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final. Disapprovals shall be in writing. See Division #1.

If the Architect approves any proposed substitution, such approval will be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.

Addenda

Addenda will be mailed or delivered to all who are known by the Architect to have received a complete set of Bidding Documents.

Copies of addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

Each Bidder shall ascertain from the Architect prior to submitting his Bid that he has received all addenda issued, and he shall acknowledge their receipt on the Proposal Form.

ARTICLE 4 - BIDDING PROCEDURE

Form and Style of Bids

Bids shall be submitted on the forms provided by the Architect.

All blanks on the Bid form shall be filled in by typewriter or manually in ink.

Where so indicated by the makeup of the Bid form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written amount shall govern.

Any interlineation, alteration or erasure must be initialed by the signer of the Bid.

Bidders are cautioned to complete all Alternates and Unit Prices, should such be required in the Bid form; failure to submit Alternates and Unit Prices will render the proposal informal and may cause its rejection.

Bidder shall make no additional stipulations on the Bid form, nor qualify his Bid in any other manner.

The Bid shall include the legal name of Bidder and statement whether Bidder is a Sole Proprietor, a Partnership, a Corporation, or any other legal entity, and the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid submitted by an agency shall have a current Power of Attorney attached, certifying agent's authority to bind Bidder.

On any Bid in excess of Fifty Thousand Dollars ($50,000.00) the Contractor shall certify that he is licensed under R.S. 37:2151-2163, and show his license number on the Bid above his signature or the signature of his duly authorized representative, and on the outside of the envelope.

Submission of Bids

Bids shall be sealed in an opaque envelope and will be received until the time specified and at the place specified.

It shall be the specific responsibility of the Bidder to deliver his sealed bid to **Stantec Architecture Inc., 1200 Brickyard Lane, Baton Rouge, LA 70802** by **Wednesday, April 3, 2024, at 2:00 p.m.** Late delivery of a Bid for any reason, including late delivery by United States Mail, may disqualify the Bid. The Bid envelope shall be identified on the outside with the name of the project, and the name, address, and license number of the Bidder.

If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope, with the notation "Bid Enclosed" on the face thereof.

Bids shall be deposited at the designated location prior to the time on the date for receipt of Bids, or any extension thereof made by addendum. Bids received after the time and date for receipt of Bids will be returned unopened.

Bidder shall assume full responsibility for timely delivery at location designated for receipt of Bids.

Oral, telephonic or telegraphic Bids are invalid and will not receive consideration; nor will notations on the envelope for amending the Bid.

Modification or Withdrawal of Bid

A Bid may not be modified, withdrawn or canceled by the Bidder for a period of 45 days following

the time and date designated for the receipt of Bids, and Bidder so agrees in submitting his Bid.

Prior to the time and date designated for receipt of Bids, Bids submitted early may be modified or withdrawn only by notice to the party receiving Bids at the place and prior to the time designated for receipt of Bids.

Withdrawn Bids may be resubmitted up to the time designated for the receipt of Bids, provided they are then fully in conformance with these Instructions to Bidders.

ARTICLE 5 - CONSIDERATION OF BIDS

Opening of Bids

The properly identified Bids received on time will be opened publicly and will be read aloud, and a tabulation abstract of the amount of the Base Bid and major Alternates, if any, will be made available to Bidders.

Rejection of Bids

The Owner shall have the right to reject any or all Bids.

Acceptance of Bid

The Owner shall have the right to waive any informality or irregularity in any Bid received.

It is the intent of the Owner to award a contract to the lowest responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents, is judged to be reasonable, and does not exceed the funds available.

It is the intention of the Owner to work with the low Bidder to optimize project costs.

Alternates quoted on Bid Forms will be exercised as Owner option. The Owner will award alternates in the order listed unless it does not affect the award of the contract. Accepted alternates will be listed in Owner-Contractor Agreement.

ARTICLE 6 - POST BID INFORMATION

Submissions

The Bidder shall, prior to the award of a contract for the work, submit the following information to the Architect:

The proprietary names and the suppliers of principal items or systems of material and equipment proposed for the work.

A list of names of the Sub-Contractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the work.

Schedule of Values as follows:
Submit typed schedule on AIA Form G703; 8-1/2 x 11 inch paper.
Format: Table of Contents of this Project Manual. Identify each line item with number and title of each Specification Section.

The Bidder shall be required to establish to the satisfaction of the Architect and the Owner the reliability and responsibility of the proposed Sub-Contractors to furnish and perform the work described in the sections of the Specifications pertaining to such proposed Sub-Contractors' respective trades.

Prior to the award of the contract, the Architect will notify the Bidder if either the Owner or the Architect, after due investigation, has reasonable and substantial objection to any person or

organization on the Contractor's list of proposed Sub-Contractors.

Sub-Contractors and other persons and organizations proposed by the Bidder and accepted by the Owner and Architect must be used on the work for which they were proposed and accepted, and shall not be changed except with written approval of the Owner and the Architect.

ARTICLE 7 - PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

Bonds Required

The Contractor shall furnish and pay for a performance and a payment bond written by a company licensed to do business in Louisiana, each in an amount equal to 100% of the contract sum.

Time of Delivery and Form of Bonds

The Bidder shall deliver the required bonds to the Owner simultaneously with the execution of the contract.

Bonds shall be in the form furnished by Owner, entitled CONTRACT BETWEEN OWNER AND CONTRACTOR AND PERFORMANCE AND PAYMENT BOND, a copy of which is included in the Contract Documents.

The Bidder shall require the Attorney-in-Fact who executes the required bonds on behalf of the Surety to affix thereto a certified and current copy of his Power of Attorney.

ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Form of the contract to be used shall be furnished by Owner, a copy of which is bound in the Bidding Documents.

Award

Before award of the contract, the successful Bidder shall furnish to the Owner a certified copy of the minutes of the Corporation or Partnership meeting which authorized the party executing the Bid to sign on behalf of Contractor.

ARTICLE 9 - COMPLETION TIME AND LIQUIDATED DAMAGES

The completion of the contract must be within the time stated on the Proposal Form, subject to such extensions as may be granted under Paragraph 8.3, Delays and Extensions of Time in the General Conditions, or the Contractor will be subject to pay to the Owner Liquidated Damages in the amount as stated on the Proposal Form.

ARTICLE 10 - PRE BID CONFERENCE

A **Pre-Bid Conference** will be held at the site **in the 2nd Floor Conference Room on** **TBD** The purpose of the pre-bid conference is to familiarize Bidders with the requirements of the project and the intent of the Contract Documents, and to receive comments and information from interested Bidders.

Any revisions of the Bidding Documents made as a result of the pre-bid conference shall not be valid unless included in an addendum issued in accordance with Article 3 of the Instructions to Bidders.

END OF SECTION

CONSTRUCTION PROPOSAL

(SUBMIT IN DUPLICATE)

PROJECT NAME: **PET Scan Additon to BRCC**
5231 Brittany Drive
Baton Rouge, LA

Bid Of: _____

Address: _____

DATE: _____

Having carefully examined the General Conditions, Supplementary Conditions, Instructions to Bidders, Specifications, Drawings, and Addenda numbered____, issued for the

PET Scan Additon to BRCC
5231 Brittany Drive
Baton Rouge, LA

and having visited the premises and examined all conditions affecting the work, the undersigned proposes to furnish all labor and materials called for by said documents for the entire work for the sum of:

BASE BID: _____

_____ Dollars ($_____)

WITHDRAWAL OF BID

The undersigned further agrees that the bid proposal is firm for a period of forty-five (45) days from the opening of bids and no bid proposal can be withdrawn for any reason during this period of time.

BOND

The undersigned further agrees that within fifteen (15) days after notice that the Hospital has been authorized to enter into a contract he (or they) will execute the contract and furnish to **the Owner** a satisfactory surety bond written by an insurance company licensed to do and doing business in the State of Louisiana, through or countersigned by a duly authorized agent, said bond to be in an amount equal to the amount of the contract and shall guarantee the faithful performance of the contract.

COMPLETION

The undersigned guarantees completion of the work shall be as follows:

> On or before **Two Hundred Seventy (270)** consecutive calendar days (Saturdays, Sundays, and holidays included) after award of contract and notice is given to proceed.

LIQUIDATED DAMAGES

Liquidated Damages: It is mutually agreed by and between the parties hereto that time is of the essence and that in case of the Contractor's failure to complete the contract within the time specified and agreed upon, the Owner will be damaged thereby; and because it is difficult to definitively ascertain and prove the amount of said damages, inclusive of expenses for inspection, superintendence, and necessary traveling expenses, it is hereby agreed that the amount of such damages shall be **as follows:**

Base Bid: $300.00 per day for each day after the above noted completion date (Saturday, Sundays, and holidays included) that the work remains incomplete, and Owner shall deduct such computed amount from monies due Contractor, or, if no monies are due Contractor, Contractor shall pay to the Owner such computed amount as liquidated damages, which shall not constitute a penalty.

COMMENCEMENT OF WORK

The undersigned further agrees that work will begin not later than ten (10) calendar days after the date of the Work Order and shall be diligently prosecuted at such rate and in such manner as, in the opinion of the Architect, is necessary for the completion of the work within the time specified in the contract it being understood that time is the essence of the contract.

AFFIDAVIT

The undersigned agrees to execute an affidavit in accordance with L.R.S. 38:2219 of the 1965 Louisiana Legislature concerning acquisition of public contracts.

License #_____ under Act 223 of 1956
State of Louisiana

BIDDER_____

BY _____

TITLE _____

BUSINESS ADDRESS _____

GENERAL CONDITIONS

A. The GENERAL CONDITIONS to be used on this project will be AIA Document A201 Electronic Format, **General Conditions of the Contract for Construction** , **2017 Edition.**

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions modify, change, delete from or add to the **General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition.** Where any Article of the General Conditions is modified or any Section, Paragraph, Subparagraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Section, Article, Paragraph, Subparagraph or Clause shall remain in effect.

Articles, Sections, Paragraphs, Subparagraphs or Clauses modified or deleted have the same numerical designation as those occurring in the General Conditions.

ARTICLE 1

GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1. The Contract Documents
In Section 1.1.1 delete the third sentence, and add the following sentence:
The Contract Documents shall include the Bid Documents as listed in the Instructions to Bidders and any modifications made thereto by addenda.

1.1.8 Initial Decision Maker
Delete all after the words, "shall not show partiality to the Owner or Contractor".

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE [REFER TO *La R.S. 38:2317*]

1.5.1 Delete the first sentence of the paragraph.

1.5.1 In the third sentence: delete the remainder after the word "publication".

1.7 DIGITAL DATA USE AND TRANSMISSION

In the first sentence after the words, "in digital form" delete ". The parties will use AIA Document E203 2013, Building Information Modeling and Digital Data Exhibit".

1.8 BUILDING INFORMATION MODELS USE AND RELIANCE

Delete Section 1.8.

ARTICLE 2

OWNER

2.2 EVIDENCE OF THE OWNER'S FINANCIAL ARRANGEMENTS

Delete Section 2.2.

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.3.1 In the first sentence, delete: all before "the Owner shall secure…"

Delete Section 2.3.2 and substitute the following:

2.3.2 The term Architect, when used in the Contract Documents, shall mean the prime Designer (Architect, Engineer, or Landscape Architect), or his authorized representative, lawfully licensed to practice architecture, engineering, or landscape architecture in the State of Louisiana, identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number.

2.3.3 Delete the words: "to whom the Contractor has no reasonable objection and".

ARTICLE 3

CONTRACTOR

3.4 LABOR AND MATERIALS

3.4.2 Delete Section 3.4.2.

Delete Section 3.4.3 and substitute with the following:

3.4.3 Contractor and its employees, officers, agents, representatives, and Subcontractors shall conduct themselves in an appropriate and professional manner, in accordance with the Owner's requirements, at all times while working on the Project. Any such individual who behaves in an inappropriate manner or who engages in the use of inappropriate language or conduct while on Owner's property, as determined by the Owner, shall be removed from the Project at the Owner's request. Such individual shall not be permitted to return without the written permission of the Owner. The Owner shall not be responsible or liable to Contractor or any Subcontractor for any additional costs, expenses, losses, claims or damages incurred by Contractor or its Subcontractor as a result of the removal of an individual from the Owner's property pursuant to this Section. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

3.5 WARRANTY

3.5.2 Replace reference to “Section 9.8.4” with “Section 9.8.6”.

3.9 SUPERINTENDENT

3.9.1 Add the following to the end of the paragraph:
Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

3.10 CONTRACTOR’S CONSTRUCTION AND SUBMITTAL SCHEDULES

3.10.1 Add the following: For projects with a contract sum greater than $1,000,000.00, the Contractor shall include with the schedule, for the Owner’s and Architect’s information, a network analysis to identify those tasks which are on the critical path, i.e., where any delay in the completion of these tasks will lengthen the project timescale, unless action is taken. A revised schedule shall be submitted with each Application and Certificate for Payment. No payment shall be made until this schedule is received.

3.10.3 In the first sentence, delete the word “general”.

After the first sentence, add the following:
If the Work is not on schedule, as determined by the Architect, and the Contractor fails to take action to bring the Work on schedule, then the Contractor shall be deemed in default under this Contract and the progress of the Work shall be deemed unsatisfactory. Such default may be considered grounds for termination by the Owner for cause in accordance with Section 14.2.

Add the following Sections:

3.10.4 Add the following: Submittal by the contractor of a schedule or other documentation showing a completion date for his Work prior to the completion date stated in the contract shall not impose any obligation or responsibility on the Owner or Architect for the earlier completion date.

3.10.5 In the event the Owner employs a commissioning consultant, the Contractor shall cooperate fully in the commissioning process and shall require all subcontractors and others under his control to cooperate. The purpose of such services shall be to ensure that all systems perform correctly and interactively according to the provisions of the Contract Documents.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following: This requirement is of the essence of the contract. The Architect shall determine the value of these documents and this amount shall not be approved for payment to the Contractor until all of the listed documents are delivered to the Architect in good order, completely marked with field changes and otherwise complete in all aspects.

ARTICLE 4

ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

4.2.1 In the first sentence, delete the phrase: "the date the Architect issues the final Certificate for Payment" and replace with the phrase "final payment is due, and with the Owner's concurrence, from time to time during the one year period for correction of Work described in Section 12.2."

4.2.2 In the first sentence, after the phrase: "become generally familiar with"; insert the following: "and to keep the Owner informed about".

In the first sentence, after the phrase "portion of the Work completed", insert the following: "to endeavor to guard the Owner against defects and deficiencies in the Work,"

4.2.4 In the first sentence, delete all after "The Owner and Contractor", and add the following "may communicate directly with each other, when deemed necessary by the Owner, and the Owner will notify the Architect of any decision."

4.2.10 Add the following sentence to the end of Section 4.2.10: There shall be no restriction on the Owner having a Representative.

4.2.11 Add the following sentence to the end of Section 4.2.11:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

4.2.14 Insert the following sentence between the second and third sentences of Section 4.2.14:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

ARTICLE 5

SUBCONTRACTORS

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Delete Section 5.2.1, and substitute the following:

5.2.1 Unless otherwise required by the Contract Documents, the Contractor shall furnish at the Pre-Construction Conference, to the Owner and the Architect, in writing, the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work. No Contractor payments shall be made until this information is received.

Delete Section 5.2.2, and substitute the following:

5.2.2 The Contractor shall be solely responsible for selection and performance of all subcontractors. The Contractor shall not be entitled to claims for additional time and/or an increase in the contract sum due to a problem with performance or nonperformance of a subcontractor.

Delete Sections 5.2.3 and 5.2.4 and substitute the following:

5.2.3 The Contractor shall notify the Architect and the Owner when a subcontractor is to be changed and substituted with another subcontractor.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Delete Sections 5.4, 5.4.1, 5.4.2 and 5.4.3

ARTICLE 7

CHANGES IN THE WORK

7.1 GENERAL

Add the following Sections:

7.1.4 As part of the pre-construction conference submittals, the Contractor shall submit the following prior to the Contractor's initial request for payment:

7.1.4.1 Fixed job site overhead cost itemized with documentation to support daily rates.

7.1.4.2 Bond Premium Rate with supporting information from the General Contractor's carrier.

7.1.4.3 Labor Burden by trade for both Subcontractors and General Contractor. The Labor Burden shall be supported by the Worker's Compensation and Employer's Liability Insurance Policy Information Page. Provide for all trades.

7.1.4.4 Internal Rate Charges for all significant company owned equipment.

7.1.5 If the General Contractor fails to submit the aforementioned documentation as part of the pre-construction submittals, then pay applications shall not be processed until such time as the Owner receives this information.

7.2 CHANGE ORDERS

Delete Section 7.2.1, and substitute the following Sections:

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, the Architect, and the Contractor issued after execution of the Contract, authorizing a change in the Work and/or an adjustment in the Contract Sum and/or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time. Any reservation of rights, stipulation, or other modification made on the change order by the contractor shall have no effect.

7.2.2 "Cost of the Work" for the purpose of Change Orders shall be the eligible costs required to be incurred in performance of the Work and paid by the Contractor and Subcontractors which eligible costs shall be limited to:

7.2.2.1 Actual wages paid directly to labor personnel, with a labor burden markup exclusively limited to applicable payroll taxes, worker's compensation insurance, unemployment compensation, and social security taxes for those labor personnel performing the Work. Wages shall be the basic hourly labor rate paid an employee exclusive of fringe benefits or other employee costs. The labor burden percentage for the "Cost of the Work" is limited to categories listed herein. Employer-provided health insurance, fringe benefits, employee training (whether a requirement of employment or not), vacation pay, etc., are examples of ineligible labor burden costs which ***shall not*** be included, as these costs are already compensated by the Overhead and Profit markup.

Supervision shall not be included as a line item in the "Cost of the Work", except when the change results in a documented delay in the critical path, as described in Section 7.2.7.

7.2.2.2 Cost of all materials and supplies necessary and required to perform the Work, identifying each item and its individual cost, including taxes. Incidental consumables are not eligible costs and shall not be included.

7.2.2.3 Cost of each necessary piece of machinery and equipment required to perform the Work, identifying each item and its individual cost, including taxes.

Incidental small tools of a specific trade (i.e., shovels, saws, hammers, air compressors, etc.,) and general use vehicles, such as pickup trucks even for moving items around the site, fuel for these general use vehicles, travel, lodging, and/or meals are not eligible and shall not be included.

7.2.2.4 Eligible Insurance costs shall be limited to documented increases in "Builder's Risk" insurance premium / costs only. Commercial General Liability, Automobile Liability, and all other required insurances, where referenced in the Contract shall be considered part of normal overhead. These costs are already compensated by the Overhead and Profit markup.

7.2.2.5 Cost for the General Contractor Performance and Payment Bond premium, where the documented cost of the premiums have been increased due to the Change Order.

7.2.3 Overhead and Profit - The Contractor and Subcontractor shall be due home office fixed overhead and profits on the Cost of the Work, but shall not exceed a total of 16% of the direct cost of any portion of Work.

The credit to the Owner resulting from a change in the Work shall be the sum of those items above, except credit will not be required for Overhead and Profit. Where a change results in both credits to the Owner and extras to the Contractor for related items, overhead and profit shall only be computed on the net extra cost to the Contractor.

7.2.4 The cost to the Owner resulting from a change in the Work shall be the sum of: Cost of the Work (as defined at Section 7.2.2) and Overhead and Profit (as defined at Section 7.2.3), and shall be computed as follows:

7.2.4.1 When all of the Work is General Contractor Work; 8% markup on the Cost of the Work.

7.2.4.2 When the Work is all Subcontract Work; 8% markup on the Cost of the Work for Subcontractor's Overhead and Profit, plus 8% markup on the Cost of the Work, not including the Subcontractor's Overhead and Profit markup, for General Contractor's Overhead and Profit.

7.2.4.3 When the Work is a combination of General Contractor Work and Subcontract Work; that portion of the direct cost that is General Contract Work shall be computed per Section 7.2.4.1 and that portion of the direct cost that is Subcontract Work shall be computed per Section 7.2.4.2.

Premiums for the General Contractor's bond may be included, but after the markup is added to the Cost of the Work.
Premiums for the Subcontractor's Bond shall not be included.

7.2.4.4 Subcontract cost shall consist of the items in Section 7.2.2 above plus Overhead and Profit as defined in Section 7.2.3.

7.2.5 Before a Change Order is prepared, the Contractor shall prepare and deliver to the Architect the following information concerning the Cost of the Work, not subject to waiver, within a reasonable time after being notified to prepare said Change Order:

A detailed, itemized list of labor, material and equipment costs for the General Contractor's Work including quantities and unit costs for each item of labor, material and equipment.

An itemized list of labor, material and equipment costs for each Subcontractor's and/or Sub-Subcontractor's Work including quantities and unit costs for each item of labor, material and equipment.

7.2.6 After a Change Order has been approved, no future requests for extensions of time or additional cost shall be considered for that Change Order.

7.2.7 Extended fixed job-site costs are indirect costs that are necessary to support the work in the field. Examples of fixed job-site costs are field office rental, salaries of field office staff, field office utilities and telephone.

Extended fixed job-site costs or equitable adjustment, may be included in a Change Order due to a delay in the critical path, with the exception of weather related delays. In the event of a delay in the critical path, the Contractor shall submit all changes or adjustments to the Contract Time **within twenty-one (21) days** of the event giving rise to the delay. The Contractor shall submit documentation and justification for the adjustment by performing a critical path analysis of its most recent schedule in use prior to the change, which shows an extension in critical path activities.

The Contractor shall notify the Architect in writing that the Contractor is making a claim for extended fixed job-site overhead as required by Section 15.1.2. The Contractor shall provide proof that the Contractor is unable to mitigate financial damages through Alternate Work within this Contract or replacement work. "Replacement Work" is that work which the Contractor is obligated to perform under any construction contract separate from this Contract. Reasonable proof shall be required by the Architect that the delays affected the Completion Date.

7.2.8 "Cost of the Work" whether General Contractor cost or Subcontractor cost shall not apply to the following:

7.2.8.1 Salaries or other compensation of the Contractor's personnel at the Contractor's principal office and branch offices.

7.2.8.2 Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work.

7.2.8.3 Overhead and general expenses of any kind or the cost of any item not specifically and expressly included above in Cost of the Work.

7.2.8.4 Cost of supervision, refer to section 7.2.2.1, with exception as provided in Section 7.2.7.

7.2.9 When applicable as provided by the Contract, the cost to Owner for Change Orders shall be determined by quantities and unit prices. The quantity of any item shall be as submitted by the Contractor and approved by the Architect. Unit prices shall cover cost of Material, Labor, Equipment, Overhead and Profit.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.3 In the first sentence after "following methods" insert: ", but not to exceed a specified amount".

7.3.4 From .1 of the list, delete all after "Costs of labor, including" and substitute the following "social security, old age and employment insurance, applicable payroll taxes, and workers' compensation insurance;"

Delete the following from .4 of the list: "permit fees,"

Delete Section 7.3.9 and substitute the following:

7.3.9 Pending final determination of the total costs of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs.

ARTICLE 8

TIME

8.1 DEFINITIONS

Add the following:

8.1.5 The Contract Time shall not be changed by the submission of a schedule that shows an early completion date unless specifically authorized by change order.

8.2 PROGRESS AND COMPLETION

Add to Section 8.2.1 the following:

Completion of the Work must be within the Time for Completion stated in the Agreement, subject to such extensions as may be granted under Section 8.3. The Contractor agrees to commence Work not later than fourteen (14) days after the transmittal date of Written Notice to Proceed from the Owner and to substantially complete the project within the time stated in the Contract. The Owner will suffer financial loss if the project is not substantially complete in the time set forth in the Contract Documents. The Contractor and the Contractor's Surety shall be

liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and liquidated damages for each consecutive calendar day (Saturdays, Sundays and holidays included) of delay until the Work is substantially complete. The Owner shall be entitled to the sum stated in the Contract Documents. Such Liquidated Damages shall be withheld by the Owner from the amounts due the Contractor for progress payments.

Delete Section 8.2.2.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 In the first sentence after the words "Owner pending" delete the words "mediation and binding dispute resolution" and add the word "litigation", and delete the last word "determine" and add the following: "recommend, subject to Owner's approval of Change Order. If the claim is not made within the limits of Article 15, all rights for future claims for that month are waived."

ARTICLE 9

PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

Delete Section 9.1.2.

Delete Section 9.2 and substitute the following:

9.2 SCHEDULE OF VALUES

At the Pre-Construction Conference, the Contractor shall submit to the Owner and the Architect a Schedule of Values prepared as follows:

9.2.1 If applicable, the cost of Work for each section listed under each division, shall be given. The cost for each section shall include Labor, Materials, Overhead and Profit.

9.2.2 The Total of all items shall equal the Total Contract Sum. This schedule, when approved by the Architect, shall be used as a basis for the Contractor's Applications for Payment and it may be used for determining the cost of the Work in deductive change orders, when a specific item of Work listed on the Schedule of Values is to be removed. Once the Schedule of Values is submitted at the Pre-Construction Conference, the schedule shall not be modified without approval from the Owner and Architect.

9.3 APPLICATIONS FOR PAYMENT

Delete Sections 9.3.1, 9.3.1.1, and 9.3.1.2 and substitute the following:

9.3.1 Monthly, the Contractor shall submit to the Architect an Application & Certificate for Payment on the AIA Document G702-1992, accompanied by AIA Document G703-1992,

and supported by any additional data substantiating the Contractor's right to payment as the Owner or the Architect may require. Application for Payment shall be submitted on or about the first of each month for the value of labor and materials incorporated into the Work and of materials, suitably stored, at the site as of the twenty-fifth day of the preceding month, less normal retainage as follows, per La R.S. 38:2248:

9.3.1.1 – **10% of the Contract price**.

9.3.1.2 No payment shall be made until the revised schedule required by Section 3.10.1 is received.

9.3.1.3 The normal retainage shall not be due the Contractor until after substantial completion and expiration of the **thirty (30)** day lien period and submission to the Architect of a clear lien certificate, consent of surety, and invoice for retainage.

Delete Section 9.3.2 and substitute the following:

9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. Payments for materials or equipment stored on the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, including applicable insurance.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Section 9.5.1.7: Delete the word "repeated".

Delete Section 9.5.4.

9.6 PROGRESS PAYMENTS

Delete Section 9.6.1 and substitute the following:

9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment within twenty days except for projects funded fully or in part by a Federal reimbursement program. For such projects the Owner will make payment in a timely manner consistent with reimbursement.

9.6.2 Delete the phrase: "no later than seven days" from the first sentence.

After the end of the second sentence, add the following:

La R.S. 9:2784 (A) and (C) require a Contractor or Subcontractor to make payment due to each Subcontractor and supplier within fourteen (14) consecutive days of the receipt of

payment from the Owner. If not paid, a penalty in the amount of ½ of 1% per day is due, up to a maximum of 15% from the expiration date until paid. The contractor or subcontractor, whichever is applicable, is solely responsible for payment of a penalty.

9.6.4 FOR PROJECTS IN THE STATE OF LOUISIANA ONLY Delete the first two sentences of Section 9.6.4 and add the following to the end of the Section:

Pursuant to La. R.S. 38:2242 and La. R.S. 38:2242.2, when the Owner receives any claim of nonpayment arising out of the Contract, the Owner shall deduct 125% of such claim from the Contract Sum. The Contractor, or any interested party, may deposit security, in accordance with La. R.S. 38:2242.2, guaranteeing payment of the claim with the recorder of mortgages of the parish where the Work has been done. When the Owner receives original proof of such guarantee from the recorder of mortgages, the claim deduction will be added back to the Contract Sum.

Delete Section **9.7 FAILURE OF PAYMENT**.

Delete Section 9.8 and substitute the following:

9.8 SUBSTANTIAL COMPLETION

9.8.1 Substantial Completion is the stage in the progress of the Work when the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Architect shall determine if the project is substantially complete in accordance with this Section.

9.8.2 When the Contractor considers that the Work is Substantially Complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

9.8.3 Upon receipt of the Contractor's list, the Architect shall make an inspection to determine whether the Work is substantially complete. A prerequisite to the Work being considered as substantially complete is the Owner's receipt of the executed Roofing Contractor's and Roofing Manufacturer's guarantees, where roofing Work is part of the Contract. Prior to inspection by the Architect, the Contractor shall notify the Architect that the project is ready for inspection by the State Fire Marshal's office. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use, the Contractor shall, before the Work can be considered as Substantially Complete, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

9.8.4 When the Architect determines that the project is Substantially Complete, he shall prepare a punch list of exceptions and the dollar value related thereto. The monetary

value assigned to this list will be the sum of the cost estimate for each particular item of Work the Architect develops based on the mobilization, labor, material and equipment costs of correcting the item and shall be retained from the monies owed the contractor, above and beyond the standard lien retainage. The cost of these items shall be prepared in the same format as the schedule of values. At the end of the **thirty day lien period** payment shall be approved for all punch list items completed up to that time. After that payment, none of the remaining funds shall be due the contractor until all punch list items are completed and are accepted by the Architect. If the dollar value of the punch list exceeds the amount of funds, less the retainage amount, in the remaining balance of the Contract, then the Project shall not be considered as substantially complete. If funds remaining are less than that required to complete the Work, the Contractor shall pay the difference.

9.8.5 When the preparation of the punch list is complete the Architect shall prepare a Substantial Completion document incorporating the punch list and submit it to the Owner for acceptance. The Contractor shall record the Substantial Completion with the Clerk of Court in the **Parish/County** in which the Work has been performed. If the Substantial Completion has not been recorded seven (7) days after issuance, the Owner may record e it at the Contractor's expense. All additive change orders must be processed before issuance of the Substantial Completion. The Owner shall not be responsible for payment for any Work associated with change orders that is not incorporated into the contract at the time of the Substantial Completion.

9.8.6 Warranties required by the Contract Documents shall commence on the date of Substantial Completion unless otherwise agreed to in writing by the Owner and Contractor. Unless otherwise agreed to in writing by the Owner and Contractor, security, maintenance, heat, utilities, damage to the Work not covered by the punch list and insurance shall become the Owner's responsibility on the Date of Substantial Completion.

9.8.7 If all punch list items have not been completed by the end of the **thirty (30) day** lien period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within forty-five (45) days after notification, the Surety has not completed the punch list, through no fault of the Architect or Owner, the Owner may, at his option, contract to have the balance of the Work completed and pay for such Work with the unpaid funds remaining in the Contract sum. **Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future contracts.** If the surety fails to complete the punch list within the stipulated time period, the Owner may not accept bonds submitted, in the future, by the surety.

9.9 PARTIAL OCCUPANCY OR USE

Delete Section 9.9.1 and substitute the following:

9.9.1 Partial Occupancy is that stage in the progress of the Work when a designated portion of the Work is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the designated portion of the Work for its intended use. The

Owner may occupy or use any substantially completed portion of the Work so designated by separate agreement with the Contractor and authorized by public authorities having jurisdiction over the Work. Such occupancy or use may commence provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers the designated portion substantially complete the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.1 After the second sentence, add the following:

If the Architect does not find the Work acceptable under the Contract Documents, the Architect shall make one additional inspection; if the Work is still not acceptable, the Architect, and each of the Architect's principal consultants, shall be paid $175.00/hour for their time at the project site, for each additional inspection, to be withheld from the unpaid funds remaining in the Contract sum. The payment shall be made by the Owner and deducted from the construction contract funds.

Delete Section 9.10.4 and replace with the following:

9.10.4 The making of final payment shall not constitute a waiver of Claims by the Owner for the following:

9.10.4.1 Claims, security interests, or encumbrances arising out of the Contract and unsettled;

9.10.4.2 failure of the Work to comply with the requirements of the Contract Documents irrespective of when such failure is discovered;

9.10.4.3 terms of special warranties required by the Contract Documents; or

9.10.4.4 audits performed by the Owner, after final payment.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.2 In the first sentence, between the words: "bearing on" and "safety", add the words: "the health and,"

10.3 HAZARDOUS MATERIALS

10.3.1 In the second sentence after (PCB) add: "or lead".

10.3.2 After the first sentence, delete all remaining sentences.

Add at the end: "The Contract time shall be extended appropriately."

Delete Section 10.4 and substitute the following:

10.4 EMERGENCIES

In an emergency affecting the safety of persons or property, the Contractor shall notify the Owner and Architect immediately of the emergency, simultaneously acting at his discretion to prevent damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency Work shall be determined as provided in Article 15 and Article 7.

ARTICLE 11

INSURANCE AND BONDS

AIA A101 – 2017 Exhibit A is not a part of these documents. Delete all of Sections 11.1, 11.2, 11.3, 11.4, and 11.5, and substitute the following with Qualification of: notwithstanding the foregoing, all Terms and Conditions in Sections 11.1, 11.2, 11.3, 11.4, and 11.5 of AIA A201-2017 are unamended as pertains to the Architect and Architect's Consultants.

INSURANCE REQUIREMENTS FOR NEW CONSTRUCTION, ADDITIONS AND RENOVATIONS

11.1 CONTRACTOR'S LIABILITY INSURANCE

The Contractor shall purchase and maintain without interruption for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work hereunder by the Contractor, its agents, representatives, employees or subcontractors. The duration of the contract shall be from the inception of the contract until the date of final payment.

11.2 MINIMUM SCOPE AND LIMITS OF INSURANCE

11.2.1 Worker's Compensation

Worker's Compensation insurance shall be in compliance with the Worker's Compensation law of the Contractor's headquarters. Employers Liability is included with a minimum limit of $1,000,000 per accident/per disease/per employee. If Work is to be performed over water and involves maritime exposure, applicable LHWCA, Jones Act or other maritime law coverage shall be included. A.M. Best's insurance company rating requirement may be waived for Worker's compensation coverage only.

11.2.2 Commercial General Liability

Commercial General Liability insurance, including Personal and Advertising Injury Liability and Products and Completed Operations Liability, shall have a minimum limit per occurrence based on the project value. The Insurance Services Office (ISO) Commercial General Liability occurrence coverage form CG 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. Claims-made form is unacceptable.

The aggregate loss limit must apply to each project. ISO form CG 25 03 (current form approved for use in Louisiana), or equivalent, shall also be submitted. The State project number, including part number, and project name shall be included on this endorsement.

COMBINED SINGLE LIMIT (CSL) PER OCCURRENCE

Type of Construction	**Projects up to $1,000,000**	**Projects over $1,000,000 up to $10,000,000**	**Projects over $10,000,000**
New Buildings:			
Each Occurrence Minimum Limit	$1,000,000	$2,000,000	$4,000,000
Per Project Aggregate	$2,000,000	$4,000,000	$8,000,000
Renovations:	**The building(s) value for the Project is $_____.**		
Each Occurrence Minimum Limit	$1,000,000**	$2,000,000**	$4,000,000**
Per Project Aggregate	2 times per occur limit**	2 times per occur limit**	2 times per occur limit**

**While the minimum Combined Single Limit of $1,000,000 is required for any renovation, the limit is calculated by taking 10% of the building value and rounding it to the nearest $1,000,000 to get the insurance limit. Example: Renovation on a $33,000,000 building would have a calculated $3,000,000 combined single limit of coverage (33,000,000 times .10 = 3,300,000 and then rounding down to $3,000,000). If the calculated limit is less than the minimum limit listed in the above chart, then the amount needed is the minimum listed in the chart. Maximum per occurrence limit required is $10,000,000 regardless of building value. The per project aggregate limit is then calculated as twice the per occurrence limit.

11.2.3 Automobile Liability

Automobile Liability Insurance shall have a minimum combined single limit per occurrence of $1,000,000. ISO form number CA 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. This insurance shall include third-

party bodily injury and property damage liability for owned, hired and non-owned automobiles.

11.2.4 Excess Umbrella

Excess Umbrella Insurance may be used to meet the minimum requirements for General Liability and Automobile Liability only.

11.2.5 Builder's Risk

11.2.5.1 Builder's Risk Insurance shall be in an amount equal to the amount of the construction contract including any amendments and shall be upon the entire Work included in the contract. The policy shall provide coverage equivalent to the ISO form number CP 10 20, Broad Form Causes of Loss (extended, if necessary, to include the perils of wind, earthquake, collapse, vandalism/malicious mischief, and theft, including theft of materials whether or not attached to any structure). The policy must include architects' and engineers' fees necessary to provide plans, specifications and supervision of Work for the repair and/or replacement of property damage caused by a covered peril, not to exceed 10% of the cost of the repair and/or replacement.

11.2.5.2 Flood coverage shall be provided by the Contractor on the first floor and below for all projects, except as otherwise noted. The builder's risk insurance policy, sub-limit for flood coverage shall not be less than ten percent (10%) of the total contract cost per occurrence. If flood is purchased as a separate policy, the limit shall be ten percent (10%) of the total contract cost per occurrence (with a max of $500,000 if NFIP). Coverage for roofing projects shall **not** require flood coverage.

11.2.5.3 A Specialty Contractor may provide an installation floater in lieu of a Builder's Risk policy, with the similar coverage as the Builder's Risk policy, upon the system to be installed in an amount equal to the amount of the contract including any amendments. Flood coverage is not required.

11.2.5.4 The policy must include coverage for the Owner, Contractor and any subcontractors as their interests may appear.

11.2.6 Pollution Liability *(required when asbestos or other hazardous material abatement is included in the contract)*

Pollution Liability insurance, including gradual release as well as sudden and accidental, shall have a minimum limit of not less than $1,000,000 per claim. A claims-made form will be acceptable. A policy period inception date of no later than the first day of anticipated Work under this contract and an expiration date of no earlier than 30 days after anticipated completion of all Work under the contract shall be provided. There shall be an extended reporting period of at least 24 months, with full reinstatement of limits, from the expiration date of the policy if the policy is not renewed. The policy shall not be cancelled for any reason, except non-payment of premium.

11.2.7 Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and accepted by the Owner. The Contractor shall be responsible for all deductibles and self-insured retentions.

11.3 OTHER INSURANCE PROVISIONS

11.3.1 The policies are to contain, or be endorsed to contain, the following provisions:

11.3.1.1 Worker's Compensation and Employers Liability Coverage

11.3.1.1.1 To the fullest allowed by law, the insurer shall agree to waive all rights of subrogation against the Owner, its officers, agents, employees and volunteers for losses arising from Work performed by the Contractor for the Owner.

11.3.1.2 Commercial General Liability Coverage

11.3.1.2.1 The Owner, its officers, agents, employees and volunteers are to be added as additional insureds as respects liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. ISO Form CG 20 10 (for ongoing work) AND CG 20 37 (for completed work) (current forms approved for use in Louisiana), or equivalent, are to be used.

11.3.1.2.2 The Contractor's insurance shall be primary as respects the Owner, its officers, agents, employees and volunteers for any and all losses that occur under the contract. The coverage shall contain no special limitations on the scope of protection afforded to the Owner, its officers, officials, employees or volunteers. Any insurance or self-insurance maintained by the Owner shall be excess and non-contributory of the Contractor's insurance.

11.3.1.3 Builder's Risk

The policy must include an endorsement providing the following:

In the event of a disagreement regarding a loss covered by this policy, Contractor and its insurer agree to follow the following procedure to establish coverage and/or the amount of loss:

Any party to a loss may make written demand for an appraisal of the matter in disagreement. Within 20 days of receipt of written demand, the Contractor's insurer and either ORM or its commercial insurance company shall <u>each</u> select a competent and impartial appraiser and notify the other of the appraiser selected.

The two appraisers shall select a competent and impartial umpire. The appraisers shall then identify the policy or policies under which the loss is insured and, if necessary, state separately the value of the property and the amount of the loss that must be borne by each policy. If the two appraisers fail to agree, they shall submit their differences to the umpire. A written decision by any two shall determine the policy or policies and the amount of the loss. Each insurance company agrees that the decision of the appraisers and the umpire if involved shall be binding and final and that neither party will resort to litigation. Each of the two parties shall pay its chosen appraiser and bear the cost of the umpire equally.

11.3.1.4 All Coverages

11.3.1.4.1 All policies must be endorsed to require 30 days written notice of cancellation to the Agency. Ten-day written notice of cancellation is acceptable for non-payment of premium. Notifications shall comply with the standard cancellation provisions in the Contractor's policy. In addition, Contractor is required to notify Agency of policy cancellations or reductions in limits.

11.3.1.4.2 Neither the acceptance of the completed Work nor the payment thereof shall release the Contractor from the obligations of the insurance requirements or indemnification agreement.

11.3.1.4.3 The insurance companies issuing the policies shall have no recourse against the Owner for payment of premiums or for assessments under any form of the policies.

11.3.1.4.4 Any failure of the Contractor to comply with reporting provisions of the policy shall not affect coverage provided to the Owner, its officers, agents, employees and volunteers.

11.3.2 Acceptability of Insurers

All required insurance shall be provided by a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located. Insurance shall be placed with insurers with an A.M. Best's rating of **A-: VI or higher**. This rating requirement may be waived for Worker's compensation coverage only.

If at any time an insurer issuing any such policy does not meet the minimum A.M. Best rating, the Contractor shall obtain a policy with an insurer that meets the A.M. Best rating and shall submit another certificate of insurance within 30 days.

11.3.3 Verification of Coverage

Contractor shall furnish the Owner with Certificates of Insurance reflecting proof of required coverage. The Certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates are to

be received and approved by the Owner before Work commences and upon any contract renewal or insurance policy renewal thereafter. The Certificate Holder must be listed as follows:

Name of Owner
Owner Address
City, State, Zip
Attn: Project # _____

The Owner reserves the right to request complete certified copies of all required insurance policies at any time.

Upon failure of the Contractor to furnish, deliver and maintain required insurance, this contract, at the election of the Agency, may be suspended, discontinued, or terminated. Failure of the Contractor to purchase and/or maintain any required insurance shall not relieve the Contractor from any liability or indemnification under the contract.

If the Contractor does not meet the insurance requirements at policy renewal, at the option of the Owner, payment to the Contractor may be withheld until the requirements have been met, OR the Owner may pay the renewal premium and withhold such payment from any monies due the Contractor, OR the contract may be suspended or terminated for cause.

11.3.4 Subcontractors

Contractor shall include all subcontractors as insureds under its policies OR shall be responsible for verifying and maintaining the certificates provided by each subcontractor. Subcontractors shall be subject to all of the requirements stated herein. The Owner reserves the right to request copies of subcontractor's certificates at any time.

If Contractor does not verify subcontractors' insurance as described above, Owner has the right to withhold payments to the Contractor until the requirements have been met.

11.3.5 Worker's Compensation Indemnity

In the event Contractor is not required to provide or elects not to provide Worker's compensation coverage, the parties hereby agree the Contractor, its Owners, agents and employees shall have no cause of action against, and shall not assert a claim against, the **OWNER,** its departments, agencies, agents and employees as an employer, whether pursuant to the Louisiana Worker's Compensation Act **or otherwise**, under any circumstance. The parties also hereby agree that the **OWNER**, its departments, agencies, agents and employees shall in no circumstance be, or considered as, the employer or statutory employer of Contractor, its Owners, agents and employees. The parties further agree that Contractor is a wholly independent Contractor and is exclusively responsible for its employees, Owners, and agents. Contractor hereby agrees to protect, defend, indemnify and hold the **OWNER**, its departments, agencies, agents and employees

harmless from any such assertion or claim that may arise from the performance of this contract.

11.3.6 Indemnification/Hold Harmless Agreement

Contractor agrees to protect, defend, indemnify, save, and hold harmless, the **OWNER**, all Departments, Agencies, Boards and Commissions, its officers, agents, servants, employees and volunteers, from and against any and all claims, damages, expenses and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur, or in any way grow out of, any act or omission of Contractor, its agents, servants and employees, or any and all costs, expenses and/or attorney fees incurred by Contractor as a result of any claims, demands, suits or causes of action, except those claims, demands, suits or causes of action arising out of the negligence of the **OWNER** , all Departments, Agencies, Boards, Commissions, its officers, agents, servants, employees and volunteers.

Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands, suits or causes of action at its sole expense and agrees to bear all other costs and expenses related thereto, even if the claims, demands, suits, or causes of action are groundless, false or fraudulent. The **OWNER** may, but is not required to, consult with the Contractor in the defense of claims, but this shall not affect the Contractor's responsibility for the handling and expenses of all claims.

11.4 PERFORMANCE AND PAYMENT BOND

11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

11.4.3 Recordation of Contract and Bond [La R.S. 38:2241 thru 38:2241.1]

The **Contractor** shall record **within thirty (30) days** the Contract Between Owner and Contractor and Performance and Payment Bond with the Clerk of Court in the **Parish or County** in which the Work is to be performed.

ARTICLE 12

UNCOVERING AND CORRECTION OF WORK

12.2 CORRECTION OF WORK

12.2.1 Before Substantial Completion

At the end of the paragraph, add the following sentences:
"If the Contractor fails to correct Work identified as defective within a **thirty (30) day** period, through no fault of the Designer, the Owner may hold the Contractor in default. If the Owner finds the Contractor in default, the Surety shall be notified. If **within thirty (30) days** after notification, the Surety has not corrected the nonconforming Work, through no fault of the Architect or Owner, the Owner may contract to have nonconforming Work corrected and hold the Surety and Contractor responsible for the cost, including architectural fees and other indirect costs. If the Surety fails to correct the Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may elect not to accept bonds submitted in the future by the Surety. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts.

12.2.2 After Substantial Completion

12.2.2.1 At the end of the paragraph delete the last sentence and add the following sentences:
"If the Contractor fails to correct nonconforming Work, or Work covered by warranties, within a thirty (30) day period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within thirty (30) days after notification, the Surety has not corrected the non-conforming or warranty Work, through no fault of the Architect or Owner, the Owner may contract to have the nonconforming or warranty Work corrected and hold the Surety responsible for the cost including architects fees and other indirect costs. Corrections by the Owner shall be in accordance with Section 2.4. If the Surety fails to correct the nonconforming or warranty Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may not accept bonds submitted, in the future, by the Surety."

ARTICLE 13

MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Delete all after the word "located".

13.2 SUCCESSORS AND ASSIGNS

13.2.1 In the second sentence, delete "Except as … 13.2.2"

Delete Section 13.2.2.

13.3 RIGHTS AND REMEDIES

Add the following Section 13.3.3:

13.3.3 The Nineteenth Judicial Court in and for the Parish of East Baton Rouge, State of Louisiana shall have sole jurisdiction and venue in any action brought under this contract.

13.4 TESTS AND INSPECTIONS

In Section 13.4.1, delete the second sentence and substitute the following:

The Contractor shall make arrangements for such tests, inspections and approvals with the Testing Laboratory provided by the Owner, and the Owner shall bear all related costs of tests, inspections and approvals.

Delete the last two sentences of Section 13.4.1.

13.5 INTEREST

Delete Section 13.5.

ARTICLE 14

TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

Delete Section 14.1.1.4.

In Section 14.1.3, after the word "profit," delete the words "on Work not executed" and substitute the following: "for Work completed prior to stoppage".

14.2 TERMINATION BY THE OWNER FOR CAUSE

Add the following Section:

14.2.1.5 failure to complete the punch list within the lien period as provided in 9.8.7.

14.2.3 Add the following sentence:

"Termination by the Owner shall not suspend assessment of liquidated damages against the Surety."

Add the following Section:

14.2.5 If an agreed sum of liquidated damages has been established, termination by the Owner under this Article shall not relieve the Contractor and/or Surety of his obligations under the liquidated damages provisions and the Contractor and/or Surety shall be liable to the Owner for per diem liquidated damages.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

In Section 14.4.3, delete all after "incurred by reason of the termination," and add "along with reasonable profit on the Work not executed."

ARTICLE 15
CLAIMS AND DISPUTES

15.1 CLAIMS

15.1.3.1 Add the following to the end of the paragraph:
"A Reservation of Rights and similar stipulations shall not be recognized under this contract as having any effect. A party must make a claim as defined herein within the time limits provided."

15.1.4.2 In the first sentence of the Section, delete "Initial Decision Maker's" and replace with "Architect's". In the second sentence of the Section, delete "the decision of the Initial Decision Maker" and replace with: "his/her decision".

Delete Section 15.1.6.2 and substitute the following:

15.1.6.2 If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document **(in an acceptable method to the Architect-agreed upon prior to construction start)** that weather conditions had an adverse effect on the scheduled construction. An increase in the contract time due to weather shall not be cause for an increase in the contract sum. At the end of each month, the Contractor shall make one Claim for any adverse weather days occurring within the month. The Claim must be accompanied by sufficient documentation evidencing the adverse days and the impact on construction. Failure to make such Claim within **twenty-one (21) days** from the last day of the month shall prohibit any future claims for adverse days for that month. No additional adverse weather days shall be granted after the original or extended contract completion date, except those adverse weather days associated with a National Weather Service named storm or federally declared weather related disaster directly affecting the project site.

Add the following Section:

15.1.6.3 The following are considered reasonably anticipated days of adverse weather on a monthly basis:

January	11 days	July	6 days
February	10 days	August	5 days
March	8 days	September	4 days
April	7 days	October	3 days
May	5 days	November	5 days
June	6 days	December	8 days

NOTE: 0.10 inches of rain shall have fallen within a 24 hour period in order to be considered a "Rain Day". "Wet Days" associated with these "Rain Days" shall not be considered for extensions of time.

Any request for extensions of time based on "Rain Days" must indicate how these conditions had an adverse effect on subject project and the project's overall critical path. The Contractor shall make every effort to restructure schedule as not to cause an extension of the critical path.

Extensions of time will not be considered for interior work.

The Contractor shall ask for total adverse weather days. The Contractor's request shall be considered only for days over the allowable number of days stated above.

Note: Contract is on a calendar day basis.

15.2 INITIAL DECISION

15.2.1 In the second sentence, delete the word "will" and replace with: "shall always".

In the second sentence, delete the phrase: ", unless otherwise indicated in the Agreement."

In the third sentence, delete the word "mediation" and replace with: "litigation".

At the end of the third sentence, add: "arising prior to the date final payment is due".

Delete the fourth sentence.

15.2.5 In the middle of the first sentence, delete all after the phrase: "rejecting the Claim".

In the second sentence, delete the phrase: "and the Architect, if the Architect is not serving as the Initial Decision Maker,".

In the third sentence, delete all after: "binding on the parties" and add the following: "except that the Owner may reject the decision or suggest a compromise or both".

Delete Section 15.2.6.

Delete Section 15.2.6.1.

15.3 MEDIATION

Delete Section 15.3.

15.4 ARBITRATION

Delete Section 15.4.

CONTRACT

A. The contract form to be used on this project will be AIA Document A101, Standard form of Agreement Between Owner and Contractor, where the basis of payment is a stipulated sum, **2017 Edition**.

B. When the contract is executed it will contain the following information:
   Insurance Certificates
   Performance Bond
   Copy of Construction Proposal

C. Performance Bond and Labor and Material Payment Bond shall be in the form of AIA (American Institute of Architects) document A312, latest edition. Complete and submit this form in accordance with Instructions to Bidders Article 7.

SECTION 01005
ADMINISTRATIVE PROVISIONS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Title of work, and type of contract.

B. Work Sequence.

C. Invited Bidders

D. Work Sequence

E. Contractor Use of Premises.

F. Coordination.

G. Hospital Fire Procedures for Construction Workers

H. Infection Control In Construction Areas

I. Allowances.

J. Unit Prices.

K. Reference Standards.

L. Disposal of Material.

M. Demolition.

N. Unforeseen Conditions.

O. Drawings.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of this Contract comprises general construction including mechanical and electrical of

PET Scan Addition to BRCC
5231 Brittany Drive
Baton Rouge, LA

1.03 CONTRACT METHOD

A. Construct the Work under a single lump sum contract.

1.04 INVITED BIDDERS

A. Bids will be by invitation only from the following General Contractors:

1. Arkel Constructors Inc. - Baton Rouge, LA

2. Cangelosi - Ward General Contractors, LLC, Baton Rouge, LA

3. Milton J. Womack, Inc.- Baton Rouge, LA

4. Spartan Building Corp. - Madisonville, LA

5. Stuart & Company General Contractors - Baton Rouge, LA

1.05 WORK SEQUENCE

A. Construct Work in **phases** to accommodate Owner's occupancy requirements during the construction period. Coordinate construction schedule and operations with Architect. Phases shall be completed and ready for occupancy in order listed. (Example: Phase 2 cannot start until Phase 1 is completed.)

B. **One Phases as indicated on drawings.**

1.06 CONTRACTOR USE OF PREMISES

A. The Owner must have full and uninterrupted use of all existing facilities at all times during construction.

B. Necessary mechanical and electrical shut-downs must be scheduled in advance with the Owner and shall be done during non-critical times designated by the Owner. Contractor shall utilize the **SERVICE SHUT-DOWN CONFIRMATION** form found at the end of this Section when requesting a shut-down. This form shall be used for each shut-down requested and shall be submitted a minimum of **3 Days** prior to anticipated shut-down date.

C. The Contractor shall be responsible for any overtime work necessary to accomplish shut downs at non-critical times, and no extra compensation will be allowed.

D. Contractor shall keep the site and building clean at all times. Contractor shall provide one employee **as a minimum** for the sole purpose of housekeeping, **2 hours per day**, five days a week, unless the job is closed down due to a general strike or conditions beyond the control of the Contractor or until Termination of the Contract in accordance with the Contract Documents.

E. Disposal of volatile wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

F. Emergency and fire exits shall be maintained at all times.

G. No Smoking shall be allowed within facility by any employees of the Contractor. Contractor shall dismiss those found violating this Hospital regulation.

H. Access to the building shall be limited to areas as determined by the Owner prior to beginning construction.

I. Contractor may place a dumpster only at designated area near service drive to be determined by Owner.

J. Flammable materials shall be stored only in **2 hour fire rated** enclosures.

1.07 COORDINATION

A. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Execute cutting and patching to integrate elements of Work, uncover ill-timed, defective, and non-conforming work, and provide openings for penetrations of existing surfaces. Seal penetrations through floors, walls, and ceilings.

F. Asbestos: If Contractor uncovers any asbestos, they are to notify the Owner via the Architect for its removal. Contractor will coordinate with Asbestos Contractor if required.

G. Conflicts: Where a conflict exists between codes, standards, Contract Documents, or any combination of, **the most stringent requirements shall apply**. Should requirements for any item or method appear in any one area or category of Construction Documents, the item or method shall be incorporated into the Work even if not appearing in any other document.

H. Contractor shall verify all measurements of any existing condition and shall be responsible for their correctness.

1.10 ALLOWANCES

A. Costs Included in Allowances: Cost of Product to Contractor or Subcontractor, less applicable trade discounts; delivery to site and applicable taxes.

B. If cost is more or less, contract price shall be adjusted accordingly.

1.11 UNIT PRICES

A. Contractors shall submit unit prices with their bid proposal in accordance with Unit Prices Proposal Form.

B. Base Bid, Alternates and Unit Prices shall be considered in determining the Low Bidder.

C. Unit Prices shall remain firm for the duration of the construction period.

1.12 REFERENCE STANDARDS

A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the bid date unless noted specifically otherwise.

C. Obtain copies of standards when required by Contract Documents. Maintain copy at job site during progress of the specific work.

1.13 DISPOSAL OF MATERIAL

A. The Owner shall have first salvage rights to any material or equipment removed from site.

B. All salvable material that is not scheduled for re-use in this contract shall become the property of the Contractor and shall be removed from the site by the Contractor.

C. Non-salvable material, debris and rubble shall be hauled to the City Disposal Area by the General Contractor at his cost.

D. Removals shall be disposed of as soon as practical and material shall not be allowed to accumulate either inside or outside the building.

E. Salvable material shall be relocated by General Contractor as directed by Owner within the boundaries of the medical center's campus.

1.14 DEMOLITION

A. The Contractor shall perform all demolishing necessary or required to complete the work shown on the drawings or described in the specifications. Take special precautions to protect existing work which is to remain in place or to replace or repair any damage to such work. Maintain existing fire ratings accordingly.

1.15 UNFORESEEN CONDITIONS

A. Contractor shall allow **$20,000** in bid to cover unforeseen existing conditions and repairs of any concealed portion of existing damaged smoke and fire walls not reasonably anticipated. This allowance shall be reviewed and approved in writing. Balance of allowance shall be adjusted accordingly.

1.16 DRAWINGS

A. Drawings consist of the following
1.) See INDEX on sheet G- 100.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

SERVICE SHUT-DOWN CONFIRMATION

OWNER
ARCHITECT
CONTRACTOR
FIELD

DATE_____

OWNER BRCC

5231 Brittany Drive
Baton Rouge, LA

CONTRACTOR

THE CONTRACTOR HEREBY REQUESTS FROM THE OWNER TO TEMPORARILY SHUT DOWN MECHANICAL AND/OR ELECTRICAL SYSTEMS LISTED BELOW FOR THE STIPULATED TIME SPANS.

Service to be shut down _____

Area to be affected by shut-down _____

Date of shut-down requested _____

Beginning time of shut-down _____

Minimum anticipated time required _____

Maximum anticipated time required _____

Special precaution, if any: _____

Special turn-on or start-up requirements: _____

APPROVED BY: Contractor _____

APPROVED BY: BRCC _____

END OF SECTION

SECTION 01045
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

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

B. Where cutting is required to complete installations as may be shown on architectural, civil, structural, mechanical, and/or electrical drawings.

1.02 RELATED REQUIREMENTS

A. Section 01005 - Administrative Provisions

B. Individual Specifications 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.

1.03 SUBMITTALS

A. Submit written request in advance of cutting or alteration which affects:
1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight-exposed elements.

B. Include in request:
1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or alteration.
4. Description of proposed work, and products to be used.
5. Alternatives to cutting and patching.
6. Effect of work on Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Those required for original installation or **to match original installation.**
B. For any change in materials, submit request for substitution under provisions of Section 01600.

PART 3 - EXECUTION

3.01 GENERAL

A. Unless noted otherwise in specific sections cutting shall be done as required under individual sections.

B. All patching shall be done by General Contractor. Contractor shall make neat and substantial joints between existing and new work, including patching, painting, finishing, etc. Restore exposed finishes of patched areas and where necessary extend finish restoration into adjoining work in a manner which will eliminate evidence of patching and refinishing. All work shall be left in a complete

and finished condition, including those existing surfaces affected by Work in this contract.

C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
   1. Fit the several parts together, to integrate with other work.
   2. Uncover work to install ill-timed work.
   3. Remove and replace defective and non-conforming work.
   4. Remove samples of installed work for testing.
   5. Provide openings in elements of Work for penetrations of mechanical and electrical work.
   6. Provide patching in elements of Work in order to close openings created by the elimination of components or caused by new smaller construction components replacing larger existing components.

3.02 INSPECTION

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

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

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

3.03 PREPARATION

A. Provide supports to assure structural integrity of surroundings. Provide devices and methods required to protect other portions of Project from damage of cutting.

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

3.04 PERFORMANCE

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

B. Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

C. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not allowed without prior approval.

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

E. Fit work airtight to pipes, sleeves, ducts, conduit, fixtures, and other penetrations through surfaces.

F. At penetrations of fire-rated and smoke walls, ceilings, or floor construction, completely seal voids with fire-rated, fire resistant material, full thickness of the construction element.

G. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Contractor participation in preconstruction conferences.
B. Contractor administration of progress meetings and pre-installation conferences.

1.02 PRECONSTRUCTION CONFERENCES

A. After notification that the Contract has been executed, the Architect shall arrange with the Owner, and Contractor and conduct a pre-construction conference to be held at the project site. The Contractor shall be responsible to see that his principal sub-contractors are in attendance and shall furnish the Architect and Owner with the following prior to the meeting:
   1. The Schedule of Values
   2. List of Sub-contractors and material suppliers
   3. The Construction Schedule

B. Architect will administer conference at *(location to be determined)* for clarification of Contractor responsibilities in use of site and for review of administrative procedures.

1.03 PROGRESS MEETINGS

A. The Contractor shall establish and conduct a regular schedule of regular meetings - **no less than monthly,** to be held on the job site throughout the construction period, and shall require attendance at the meetings by representatives of the Contractor, his principal sub-contractors, the Architect, Engineers and the Owner. All of the above shall be notified in advance of such meetings.

B. It shall be the principal purpose of these meetings or conferences, to effect coordination, cooperation and assistance in every practical way to maintain the project schedule.

C. Contractor shall make physical arrangements for meetings, prepare agenda with copies of participants, record minutes, and distribute copies within two days to Architect, participants, and those affected by decision made at meetings.

1.04 PRE-INSTALLATION CONFERENCES

A. When required in individual specification Section, convene a pre-installation conference prior to commencing work of the Section. Require attendance of entities directly affecting, or affected by, work of the Section.

B. Review conditions of installation, preparation and installation procedures, and coordination with related work.

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Procedures.
B. Construction Progress Schedules.
C. Schedule of Values.
D. Shop Drawings.
E. Product Data.
F. Manufacturer's Instructions.
G. Manufacturer's Certificates.

1.02 PROCEDURES

A. Deliver submittals to Architect at address listed on cover of Project Manual.

B. Transmit each item under Architect-Accepted Form. Identify Project, Contractor, subcontractor, major supplier; identify pertinent Drawing sheet and detail number, and Specification Section number, as appropriate. Identify deviations from Contract Documents. Provide space for Contractor and Architect/Engineer review stamps. Contractor shall review shop drawings prior to submitting to Architect.

C. Submit initial progress schedules and schedule of values in duplicate within 15 days after date of Written Notice to Proceed. After review by Architect, revise and resubmit as required. Submit revised schedules with each Application for Payment, reflecting changes since previous submittal.

D. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.

E. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.03 CONSTRUCTION PROGRESS SCHEDULES

A. Submit horizontal bar chart with separate bar for each Specification Section, identifying first work day of each week.

1.04 SCHEDULE OF VALUES

A. Submit typed schedule on AIA Form G703; 8-1/2 x 11 inch paper.

B. Format: Table of Contents of this Project Manual. Identify each line item with number and title of each Specification Section.

1.05 SCHEDULE OF SUBMITTALS

A. The contractor shall, within ten (10) days following award of the contract, submit his proposed schedule of submittals to the Architect and shall regularly update this submittal log with date of submittal and approval. This should be furnished to the Architect at the regularly scheduled progress meetings.

1.06 SHOP DRAWINGS

A. Submit one set of reproduceables or the number of opaque reproductions which Contractor requires, plus three copies which will be retained by Architect, Engineer and Owner. Where additional sets are required for Fire Marshal review, such as fire alarm and sprinkler, these shall be included with the application and review fee.
   1. Shop drawings shall include dimensions, relationships to adjacent work, arrangement and sectional views where necessary.
   2. Indicate gauges, thicknesses, finishes and furnish samples where finishes must be selected.
   3. Indicate anchoring and fastening details, including information for making connections to adjacent work.
   4. Cross reference drawing details and specifications where appropriate.

B. Contractor shall review and make notes where appropriate before submitting to the architect. The project name shall be clearly indicated on the drawings.

1.07 PRODUCT DATA

A. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work.

B. Submit the number of copies which Contractor requires, plus three copies which will be retained by Architect, Engineer and Program Manager.

C. Contractor shall review and make notes where appropriate before submitting to the architect. The project name shall be clearly indicated on the transmittal.

1.08 MANUFACTURER'S INSTRUCTIONS

A. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for product data.

1.09 SAMPLES

A. Submit full range of manufacturers' colors, textures, and patterns for Architect selection. Include identification on each sample, giving full information.

B. Provide field samples of finishes at project as required by individual sections of this specification. Samples shall be complete and may be incorporated into the work if acceptable.

PART 2 - PRODUCTS
Not Used

PART 3 - EXECUTION
Not Used

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. General Quality Control.
B. Workmanship.
C. Manufacturer's Instructions.
D. Manufacturer's Certificates.
E. Manufacturer's Field Services.

1.02 QUALITY CONTROL, GENERAL

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.03 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

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

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.04 MANUFACTURERS' INSTRUCTIONS

A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Architect before proceeding.

1.05 MANUFACTURERS' CERTIFICATES

A. When required by individual Specifications Section, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.06 MANUFACTURERS' FIELD SERVICES

A. When specified in respective Specification Sections, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.

B. Representative shall submit written report to Architect listing observations and recommendations.

1.07 TESTING LABORATORY SERVICES

A. *Owner shall employ and pay for services of an Independent Testing Laboratory to perform inspections and tests as defined in the general conditions and where called for in individual sections of this specification.*

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

specified standards.

C. Reports will be submitted to Architect and Engineer giving observations and results of tests, indicating compliance or non-compliance with specified standards and with Contract Documents.

D. Contractor shall cooperate with Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested without cost to the owner or laboratory.
   1. Notify Architect and Testing Laboratory 24 hours prior to expected time for operations requiring testing services.
   2. Notify the laboratory sufficiently in advance of cancellation of required testing operations. The contractor shall be responsible to the laboratory for charges due to failure to notify.
   3. Make arrangements with Testing Laboratory and pay for additional samples and tests for Contractor's convenience or where retesting is required.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01410
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 SELECTION AND PAYMENT

A. The Owner shall engage and pay for the services of an independent testing laboratory to perform inspection and tests of materials and construction as defined in the general conditions, except that in the event of a test failure the contractor shall pay for re-testing.

1.02 COOPERATION OF CONTRACTOR

A. The contractor shall cooperate with the laboratory and:
   1. Make available, without cost, samples of all materials to be tested in accordance with applicable standard specifications.
   2. Furnish such nominal labor and sheltered working space as is necessary to obtain samples at the project.
   3. Advise the laboratory of the identity of materials sources and instruct the suppliers to allow test or inspections by the laboratory.
   4. Notify the laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of inspection personnel.
   5. Notify the laboratory sufficiently in advance of cancellation of required testing operations. The contractor shall be responsible to the laboratory for changes due to failure to notify if requirements for testing are canceled.

1.03 TEST METHODS

A. Test and inspections shall be conducted in accordance with the latest standards of ASTM or other recognized authorities.

1.04 TEST REPORTS

A. The laboratory shall promptly submit written reports of each test and inspection made to the Owner, Architect, Project Manager, Engineer, Contractor, and to any other such party the Owner may specify.

1.05 SCHEDULE OF INSPECTIONS AND TESTS- REFER TO INDIVIDUAL SECTIONS

A. – Section 014001 – Site Work Quality Requirements

B. – Section 312000 – Earthwork

C. Section 321314 – Cement Concrete Pavement

D. Section 02300 – Earthwork (Building Pad)

E. Section 03300 – Cast-In-Place Concrete

F. Section 15400 – Plumbing

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Electricity, Lighting.
B. Telephone Service.
C. Water.
D. Sanitary Facilities.
E. Barriers.
F. Protection of Installed Work.
G. Security.
H. Water Control.
I. Cleaning During Construction.
J. Field Offices and Sheds.
K. Disposal of Material.

1.02 ELECTRICITY, LIGHTING

A. Contractor shall provide for temporary power to construction site.

C. Provide lighting for construction operations.

1.03 HEAT, VENTILATION

A. Provide as required to maintain specified conditions for construction operations, to protect materials and finishes from damage due to temperature or humidity.

B. Prior to operation of permanent facilities for temporary purposes, verify that installation is approved for operation, and that filters are in place. Provide and pay for operation, maintenance.

C. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

1.04 TELEPHONE SERVICE

A. Provide telephone service to field office for construction supervisor.

1.05 WATER

A. Contractor will provide and pay for water for construction.

1.06 SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Locations to be approved by Architect.

1.07 BARRIERS

A. Provide barriers to prevent public entry to construction areas. Barriers shall be constructed securely.

B. Protect against vehicular traffic, stored materials, dumping, chemically injurious materials, and

puddling or continuous running water.

C. Barricades left in place during darkness shall be lighted.

D. Contractor shall at all times be responsible for insuring the safety of users of the adjacent buildings from injury or damage resulting from any contact with the work, workmen or equipment. Contractor shall be further responsible for the erection of any barricades to preclude such injury or damage

1.08 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide and operate pumping equipment when necessary.

B. Barriers shall be provided around excavations left open. Shoring may be required to prevent damage to adjacent structures.

1.09 CLEANING DURING CONSTRUCTION

A. Control accumulation of waste materials and rubbish; weekly (at a minimum) dispose of off-site.

B. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

C. When working in occupied areas, waste shall be removed at the end of the particular operation each day.

D. Mow site to maintain grass level below 6" during construction.

E. If the site is not cleaned within a week of notice of unacceptable conditions, the owner will remove the waste and/or mow and charge the contractor for his expenses.

F. Streets shall be maintained free of mud and dirt.

1.10 FIELD OFFICES AND SHEDS

A. An Office shall be provided at the site: Weather-tight, with lighting, electrical outlets, heating, cooling, and ventilating equipment, and equipped with furniture: desk, chairs, plan rack, file, telephone and fax as a minimum. Contractor shall maintain construction documents, correspondence and a copy of all corrected and approved shop drawing at this location.

B. Storage sheds for tools, materials, and equipment:
Weather-tight, with heat and ventilation for Products requiring controlled conditions, with adequate space for organized storage and access, and lighting for inspection of stored materials.

1.11 REMOVAL

A. Remove temporary materials, equipments, services, and construction prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations to a depth of 2 feet; grade site as indicated. Restore existing facilities used during construction to specified, or to original, condition.

PART 2- PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Transportation and Handling.
B. Storage and Protection.
C. Equal Products.
D. Systems Demonstration.

1.02 TRANSPORTATION AND HANDLING

A. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.03 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

1.04 SUBSTITUTIONS, PRIOR APPROVALS

A. The name of a certain brand, make, or manufacturer, may denote the quality standard of the article desired.

B. A party requesting the substitution shall make written application as described herein.
1. Document each request for prior approval with complete data substantiating compliance of proposed substitution with Contract Documents. Rejection may result from insufficient information to allow the Architect or Engineer to compare the 2 products.
2. Requests for substitution shall reach the Architect not less than seven (7) working days prior to the date for the opening of bids. Requests received by the Architect after this date will not be considered.

C. If a proposed substitution is approved by the Architect, an addendum will be issued to prospective bidders not less than three (3) days prior to the date set for opening of the bids. If a substitution does not appear in an addendum, it shall mean that the Architect has not approved the product and the successful bidder shall be responsible for furnishing materials and products in accordance with the contract documents.

1.05 SYSTEMS DEMONSTRATION

A. Prior to final inspection, demonstrate operation of each system to Architect/Engineer and Owner.

B. Instruct Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Closeout Procedures.

B. Final Cleaning.

C. Project Record Documents.

D. Operation and Maintenance Data.

E. Warranties and Bonds.

F. Spare Parts and Maintenance Materials.

1.02 CLOSEOUT PROCEDURES

A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.

1.03 FINAL CLEANING

A. Execute prior to final inspection.

B. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment. Clean roofs, gutters, down spouts, and drainage systems.

C. Clean site; sweep paved areas, rake clean other surfaces.

D. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site.

1.04 PROJECT RECORD DOCUMENTS- **HARD COPIES AND PDF FORMAT**

A. Store documents separate from those used for construction.

B. Keep documents current; do not permanently conceal any work until required information has been recorded.

C. At Contract closeout, submit documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

D. In addition to the site-maintained record copy, the Contractor shall prepare and furnish to the Owner, thru the Architect **3 sets (3 USB Flash Drives with files in pdf format) of final record drawings** of the completed project. Such drawings shall describe the project as actually built and shall incorporate any changes made during construction.

E. Final record drawings shall be submitted to the Architect/Engineer at least 10 days prior to substantial completion of the Project.

1.05 OPERATION AND MAINTENANCE DATA

A. Provide data for:
   1. Laminated Finish Custom Casework- Section 06410
   2. Water Repellent Coating – Section 07175
   3. Metal Roof Panels – Section 07411
   4. Caulking & Sealants – Section 07951
   5. Hollow Metal Doors and Frames – Section 08113
   6. Wood Doors – Section 08210
   7. Access Doors – Section 08305
   8. Vinyl Windows – Section 08560
   9. Finish Hardware - Section 08712.
   10. Glass and Glazing - Section 08800.
   11. Gypsum Board Systems – 09260
   12. Suspended Acoustical Ceilings – Section 09511
   13. Resilient Flooring - Section 09650.
   14. Painting – Section 09900
   15. Non-Illuminated Interior Message Panels – Section 10443
   16. Fire Extinguisher Cabinets – Section 10520
   17. Shades – Section 12512
   18. Lead Radiation Shielding – Section 13090
   19. Mechanical equipment and controls - Division 15.
   20. Electrical equipment and controls - Division 16.

B. Submit **one set** prior to final inspection, bound in 8-1/2 x 11 inch three-ring side binders with durable plastic covers with table of contents and index tabs for each item and **two sets** of electronic documents in **pdf format on a compact disc or USB flash drive.**

C. Provide Operation and maintenance instructions, arranged by system. For each system give names, addresses, and telephone numbers of subcontractors and suppliers.
   List:
   1. Appropriate design criteria.
   2. List of equipment.
   3. Parts list.
   4. Operating instructions.
   5. Maintenance instructions, equipment.
   6. Maintenance instructions, finishes.
   7. Shop drawings and product data.
   8. Warranties.

1.06 WARRANTIES AND BONDS

A. Provide duplicate copies. Execute Contractor's submittals and assemble documents executed by subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in binder with durable plastic cover and **2 USB Flash Drives with information in pdf format.**

B. Submit material prior to final application for payment.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of Work. Coordinate with Owner, deliver to Project site and obtain receipt prior to final payment.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section. When conflicts arise between these Technical Specifications and the General and Supplementary Conditions, the General and Supplementary Conditions shall govern.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control of the Site Work.

B. For the Project, testing and inspecting services shall be as follows:
   1. All on-site material testing, monitoring activities and other quality assurance requirements shall be provided by a qualified testing agency selected and paid by the Owner. These activities shall include those listed as being performed by the Owner in the East Baton Rouge Parish Standard Specifications for Public Works Construction, latest edition.
   2. All off site material testing shall be provided by a qualified testing agency and paid by the Contractor

C. Additionally, the Owner shall select and pay for testing and inspection services as described in the Sections.

D. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-control requirements for individual construction activities are described in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-control services required by Owner’s Representative, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

E. Related Sections include the following:
   1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
   2. Divisions 2 through 33 Sections for specific test and inspection requirements.

1.03 DEFINITIONS

A. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Owner’s Representative.

B. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.04 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience, include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Description of test and inspection.
   3. Identification of applicable standards.
   4. Identification of test and inspection methods.
   5. Number of tests and inspections required.
   6. Time schedule or time span for tests and inspections.
   7. Entity responsible for performing tests and inspections.
   8. Requirements for obtaining samples.

C. Reports: Prepare and submit certified written reports that include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.

5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspection.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, notices, receipts for fee payments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.2 QUALITY ASSURANCE

A. Excavation and Embankment Qualifications: A firm or individual experienced in the excavation and embankment, safety and operations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

B. Professional Land Surveyor or Professional Engineer Qualifications: A professional land surveyor or professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing surveying services or engineering services of the kind indicated. Surveying or professional engineering services are defined as those performed for measurement of embankments, dredging, dredging fill similar to those indicated for this Project in material, design, and extent.

C. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.

D. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

1.3 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.
1. Testing agency will notify Owner’s Representative and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Owner’s Representative, as required within each specification section, with copy to Contractor and to authorities having jurisdiction.
3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
5. Testing agency will retest and reinspect corrected work.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Owner's Representative and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Owner's Representative and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service directly to the Contractor and the Owner's Representative.
4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
5. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field-curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
1. Distribution: Distribute schedule to Owner, Owner's Representative, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore finish construction.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

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 work consists of construction and maintenance of erosion control and management control features as described in these Drawings and Specifications for the clearing and grading of the proposed site.

B. Facility & Property Information:
   1. Facility Name: PET Scan Addition to BRCC
   2. Address: 5231 Brittany Drive, Baton Rouge, LA 70808
   3. Legal Description: Lots 18-A-1 & B-1-A-1 of Calais Office Park, located in Section 52, Township 7 South, Range 1 East, Greensburg Land District, City of Baton Rouge East Baton Rouge Parrish, State of Louisiana,
   4. Property Owner: BRCC Properties, LLC, 5231 Brittany Drive, Baton Rouge, LA 70808

C. The Stormwater Pollution Prevention Plan includes:
   1. Certification of Compliance
   2. LPDES Notice of Intent (NOI)
   3. Erosion and Sediment Controls
   4. Other Controls
   5. Stormwater Management Controls
   6. Inspection and Maintenance of Controls
   7. Records of Construction Activities
   8. LPDES Notice of Termination (NOT)

D. Related Sections include the following:
   1. Division 1 Section "Field Engineering" for verifying utility locations and for recording field measurements.
   2. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
   3. Division 2 Section "Earthwork" for excavation in borrow areas and stockpiling materials, removal of unsuitable material and for foundation preparation and construction of embankments and other incidental earthwork.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Erosion and Sediment Controls
   1. Temporary Seeding, Fertilizer, Mulch, Silt Fencing, Hay Bales and Stabilized Construction Entrance shall be in accordance with Section 204 and subsequent sections of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition.

PART 3 - EXECUTION

3.01 PREPARATION

A. Department of Development Environmental Recommendation, ESC Map & Posting Notice
   1. Contractor and Sub-Contractors shall complete, sign and submit Environmental Recommendation Form along with the Erosion and Sediment Control Map and Posting Notice for this specific site, to Subdivision Office, Department of Development, City of Baton Rouge. (Contact Subdivision Office for form)

B. LPDES Notice of Intent (NOI)
   1. Contractor shall complete and submit the “LPDES Notice of Intent (NOI) to Discharge Stormwater Associated with Construction Activity” to the State of Louisiana - Department of Environmental Quality, Certified Mail. A copy of this document, with copy of certified mail receipt, shall also be submitted to the Environmental Division of the Department of Public Works, City of Baton Rouge. (Contact LA DEQ Permits Division for form)

C. LPDES Notice of Termination (NOT):

1. Contractor shall complete and submit the "LPDES Notice of Termination (NOT) of Coverage Under LPDES General Permit for Stormwater Discharges Associated with Construction Activity" to the State of Louisiana - Department of Environmental Quality, Certified Mail. A copy of this document, with copy of certified mail receipt, shall also be submitted to the Environmental Division of the Department of Public Works, City of Baton Rouge. (Contact LA DEQ Permits Division for form)

3.02 FIELD PROCEDURES

A. Erosion and Sediment Controls:
   1. Erosion and Sediment Controls for this project will include temporary seeding (and mulching where required) of all disturbed areas, silt fencing and check dams as indicated. These measures are to be used for erosion and sediment controls throughout the time of construction. Temporary seeding and fertilizer shall be executed in accordance with Section 204, of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition. Silt fencing and check dams shall be executed in accordance with Section 204 of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition. Locate and clearly flag trees and vegetation to remain or to be relocated.
   2. Perimeter silt fencing shall be erected immediately and prior to any clearing and grading activities. Construction of controls and stabilization measures shall be by personnel experienced and/or adequately trained in this type of installation.
   3. Controls shall be constructed and the stabilization measures applied in the order indicated on the Drawing. Construction of controls and stabilization measures shall be by personnel experienced and/or adequately trained in this type of installation.

B. Other Controls:
   1. In addition to erosion and sediment controls, the Contractor shall be responsible in addressing other potential pollutant sources on the construction site, which may include compliance with applicable State and City-Parish waste disposal, control of offsite vehicle tracking, and control of dust generated by construction activities. A stabilized construction entrance shall be installed as indicated.
   2. The Contractor shall be responsible for all temporary drainage conditions during construction of the Project. Temporary drainage ditches and swales and, in particular, Sedimentation Basins, shall be provided during construction - as required by the phases and means and methods employed by the Contractor. At no time will the Contractor be allowed to drain directly (sheet flow) into the subsurface collections system or adjacent properties.

C. Inspection and Maintenance of Controls:
   1. Contractor shall inspect controls every 7 days or within 24 hours of a storm of 0.5 inches in depth. All disturbed areas of the site, areas of material storage, and all of the erosion and sediment controls should be inspected. Controls must be in good operating condition until the area they protect has been completely stabilized and the construction activity is complete.
   2. During each inspection, the contractor should complete the stabilization or structural measures inspection report form, included in this specification and note any damages or deficiencies

D. Records of Construction Activities:
   1. Contractor shall keep records of the construction activity on-site. Records shall include, but not limited to:
      a. All completed inspection report forms.
      b. Dates of major grading activities in all areas of the site.
      c. Dates of stabilization of all areas of the site
   2. A copy of the Stormwater Pollution Prevention Plan must be kept at the construction site from the time construction begins until the site is finally stabilized.
   3. The Contractor shall retain copies of the Stormwater Pollution Prevention Plan and all other reports required by the permit, as well as all of the data used to complete the NOI for 3 years after the completion of final site stabilization. The Contractor shall provide copies to the Engineer.

E. Report Releases of Reportable Quantities:
   1. Contractor shall have the responsibility to report spills of hazardous substances in amounts that equal or exceed Reportable Quantity (RQ) levels in accordance with EPA regulations (40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302). If there is a RQ

release during the construction period, the Contractor must take the following minimum steps:

a. Notify the National Response Center immediately at (800) 424-8802.
b. Submit a written description of the release to the EPA Regional Office providing the date and circumstances of the release and the steps to be taken to prevent another release.
c. Notify the Engineer.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section. When conflicts arise between these Technical Specifications and the General and Supplementary Conditions, the General and Supplementary Conditions shall govern.

1.02 SUMMARY

A. This Section includes general procedural requirements governing execution of the Site Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. Installation of the Site Work.
   4. Cutting and patching.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.
   8. Correction of the Work and work access areas.

1.03 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of

B. Patching: Fitting and repair work required to restore construction to original conditions after

1.04 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
   1. Structural Elements: When cutting and patching structural elements, notify Owner's Representative of locations and details of cutting and await directions from Owner's Representative before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
   2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
      a. Primary operational systems and equipment.
      b. Fire separation assemblies.
      c. Air or smoke barriers.
      d. Fire-suppression systems.
      e. Mechanical systems piping and ducts.
      f. Control systems
      g. Communication systems.
      h. Fire-detection and -alarm systems.
      i. Conveying systems.
      j. Electrical wiring systems.
      k. Operating systems of special construction
   3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
      a. Water, moisture, or vapor barriers.
      b. Membranes and flashings.
      c. Exterior curtain-wall construction.
      d. Sprayed fire-resistive material.
      e. Equipment supports.
      f. Piping, ductwork, vessels, and equipment.
      g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Owner's Representative's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Owner's Representative for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.01 EXAMINATION

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

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning clearing and grubbing, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. In particular, the Contractor shall be responsible for verifying, by probing and/or hand digging, the location of the drainage lines along the shoreline. All drainage structures are not shown on the drawings and must be protected from damage.

C. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

D. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections

E. 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. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Owner's Representative not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner Representative's written permission.

C. 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 the Owner's Representative. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Submit requests on CSI Form 13.2A, "Request for Interpretation."

D. 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.

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

3.03 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Owner's Representative promptly.

B. General: Engage a licensed professional land surveyor to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level and plumb, of every major element as the Work progresses.
   5. Notify Owner's Representative when deviations from required lines and levels exceed allowable tolerances.
   6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including clearing and grubbing, excavation, embankment, grading, stone placement, fill and topsoil placement, concrete sidewalks, and invert elevations.

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

3.04 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of the Owner's Representative. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Owner's Representative before proceeding.
   2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two temporary benchmarks on Project site, referenced to data established by survey control points.
   1. Record temporary benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.05 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
   4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

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

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

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

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

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

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner’s Representative.
   2. Allow for building movement, including thermal expansion and contraction. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

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

3.06 CUTTING AND PATCHING

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

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

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining

construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.
   3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.07 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 subcontractor has worked. Enforce requirements strictly. Dispose of materials lawfully.
   1. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris, except as permitted by the specifications for stockpiling for use at later stages of the Project.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work. Keep roadways free of debris and mud.

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. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

F. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period.

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

3.08 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions.

3.09 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition. Restore construction access and work areas used during construction activities to before use conditions by grading, adding sod, replacement of concrete drive and parking, roadways, and other incidentals.
C. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
D. Remove and replace damaged surfaces on walks.

END OF SECTION

SECTION 02072
DEMOLITION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Remove existing paving and site structures where noted on drawing and restore remaining portion of drive/streets to remain to match adjacent areas.

1.02 RELATED WORK

A. Section 01005 - Administrative Provisions

B. Section 01500 - Construction Facilities and Temporary Controls

C. Section 01700 - Contract Closeout: Project record documents.

1.03 SUBMITTALS

A. Submit demolition and removal procedures and schedule under provisions of Section 01300.

1.04 EXISTING CONDITIONS

A. Conduct demolition to minimize interference with adjacent building areas or utilities. Maintain protected egress and access at all times.

B. Provide, erect, and maintain temporary barriers and security devices.

C. Identify existing elements to remain where indicated on construction drawings, if any.

PART 2 - PRODUCTS
Not Used

PART 3 - EXECUTION

3.01 PREPARATION

A. Erect and maintain temporary barricades to protect adjacent streets (see 01500).

B. Protect existing items which are not indicated to be altered.

3.02 EXECUTION

A. Demolish in an orderly and careful manner sawcutting as required for clean break from existing to remain. Protect existing paving.

B. Immediately remove demolished materials from site.

C. Do not burn or bury materials on site. Dispose of debris from demolition at approved waste dump areas, to comply with Parish requirements Upon completion of work, leave areas of work in clean condition.

END OF SECTION

SECTION 02281
TERMITE CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Soil treatment below slabs-on-grade for subterranean insects.

B. Soil treatment at interior and exterior foundation perimeter, for subterranean insects.

1.02 RELATED WORK

A. Section 02200 - Backfilling: Backfill materials.

1.03 REFERENCES

A. EPA - Federal Insecticide, Fungicide and Rodenticide Act.

1.04 QUALITY ASSURANCE

A. Applicator: shall be licensed and bonded within the State of Louisiana per State Statutes.

B. Applicator: Company specializing in soil treatment for termite control.

C. Materials: Provide certification that toxicants conform to requirements of authority having jurisdiction.

D. Material Packaging: Manufacturer's labels and seals identifying content.

1.05 REGULATORY REQUIREMENTS

A. Conform to State of Louisiana requirements for application licensing and authority to use toxicant chemicals.

1.06 PRODUCT DATA

A. Submit product data under provisions of Section 01300.

B. Indicate toxicants to be used, composition by percentage, dilution schedule, and intended application rate.

C. Submit manufacturers installation instructions under provisions of Section 01300.

1.07 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01700.

B. Accurately record moisture content of soil before treatment, date and rate of application, areas of application, diary of meter readings and corresponding soil coverage.

1.08 WARRANTY

A. Provide five year warranty for material and installation under provisions of Section 01700.

B. Warranty: Cover against invasion or propagation of subterranean termites, damage to building or building contents caused by termites; repairs to building or building contents so caused.

C. Inspect work annually and report in writing to Owner.

D. Owner reserves right to renew warranty for an additional year after initial 5 year warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Cyper TC Insecticide, by Control Solutions, Inc. 5903 Genoa-Red Bluff Rd, Pasadena, TX 77507

B. Demon, by Zeneca

C. Prevail, by FMC

D. Dursban T-C - Dow Elanco

E. Tenure - DowElanco

F. Dragnet FT - FMC

G. Tribute - AgrEvo

H. Durban 75WG- DowAgro Sciences

I. Prelude (Torpedo) - Zeneca

J. Substitutions: Under provisions of Section 01600 and Instructions to Bidders, Article 4.3 Substitutions.

2.02 MATERIALS

A. Toxicant Chemical: Waterbased emulsion, uniform composition, synthetic dye to permit visual identification of treated soil, of the generic chemical chlorpyrifos.

2.03 MIX DILUTION

A. Dilute toxicant chemical in accordance with manufacturers recommendations.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify the soil surfaces are unfrozen, sufficiently dry to absorb toxicant, ready to receive treatment.
B. Beginning of application means acceptance of soil conditions.

3.02 APPLICATION

A. Apply toxicant immediately prior to installation of vapor barrier under slab-on-grade or finish grading outside foundation walls.

B. Apply toxicant in accordance with manufacturer's labeling instructions.

C. Apply extra treatment to structure penetrations, pipe, ducts, and other soil penetrations.

D. Apply as a coarse spray to ensure uniform distribution.

E. Coordinate soil treatment at foundation perimeter with finish grading and landscaping work to avoid disturbance of treated soil. Retreat disturbed treated soil.

F. Within 12 months after initial treatment of the outside of the foundation, ther perimeter shall be trenched and treated as required by label and labeling. The licensee shall report the completion of the application to the outside of the foundation, to **the Louisiana Department of Agriculture and Forestry** on the Termite Perimeter application form. Rodding will be acceptable where trenching may damage flowers and/or shrubs. Maximum distance between rod holes shall be 4 inches.

3.03 RETREATMENT

A. If inspection identifies the presence of termites, retreat soil and retest.

B. Use same toxicant as for original treatment.

END OF SECTION

SECTION 02300
EARTHWORK (BUILDING PAD)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. No geotechnical information was furnished for this project. It is assumed that the soil conditions for this design are firm, stable, and non-expansive and are capable of safely supporting 1,500 lbs/sq ft bearing pressures. By using the structural plans provided, the owner holds harmless the engineer from all liability and damages arising from unstable soil conditions or from conditions where factors cause soil conditions to become unstable and allow movement within the foundation and structural system. If conditions are found to be other than herein stated, stop operations and notify the structural engineer.

1.2 SUMMARY

A. This Section includes the following:
1. Preparing subgrades for buildings.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Excavating and backfilling for utility trenches.
5. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include the following:
1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 03 Section "Cast-in-Place Concrete".

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Drainage Course: Course beneath the slab that minimizes upward capillary flow of pore water.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

I. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
2. Test reports on borrow material.
3. Field density test reports.
4. One optimum moisture-maximum density curve for each type of soil encountered.

1.5 QUALITY ASSURANCE

A. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

C. Testing & Inspection Service: Owner will engage and pay for soil testing and inspection service for quality control testing during earthwork operations. Contractor shall pay for all retesting of failed tests.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Existing Utilities: Locate existing underground utilities before performing earthwork. If utilities are to remain in place, provide protection from damage during earthwork operations.

C. Interruption of Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
   1. Notify Architect not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

D. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soils:
   1. Imported soil fill material used to raise the site grade shall be either a low plasticity silty or sandy clay (USCS Classification, CL) or a clayey sand (SC), shall be free of roots, construction debris, organic matter or any other deleterious materials, have a maximum clay lump size less than two (2) inches and have a liquid limit of less than 45 and a plasticity index value between 10 and 25. If a fine-grained sandy clay soil is used for select fill, close moisture content control will be required to achieve the recommended degree of compaction.

B. Unsatisfactory Soils: Soils other than satisfactory soils.
   1. Unsatisfactory soils also include satisfactory soils not maintained within -2 to +3 percentage points of the optimum moisture content at time of compaction as determined by the Standard Proctor test (ASTM D 698

C. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

D. Drainage Course: Provide a stone or sand drainage layer (per list below) at contractor’s option beneath the concrete slab and vapor retarder.
   1. A 4” thick layer number 8 washed gravel per ASTM C33, complying with the following gradation:

Sieve Size	Percent Passing
1/2”	100
3/8”	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

2. A 4” thick layer of number 57 crushed and washed limestone per ASTM C33. complying with the following gradation:

Sieve Size	Percent Passing
1-1/2”	100
1”	95 to 100
1/2"	25 to 60
No. 4	0 to 10
No. 8	0 to 5

3. A 7” thick layer of clean, free draining sand free of roots, construction debris, organic matter or any other deleterious materials in accordance with ASTM C33. Sand fill shall have a maximum plasticity index of 7 in accordance with ASTM D 4318 and not more than 15% passing a No. 200 sieve, in accordance with ASTM C 117. Sand shall be placed over a continuous geotextile fabric.

E. Geotextile Fabric: Provide a Terratex N04 geotextile fabric (or approved equal) beneath a sand drainage layer. Geotextile fabric is not required beneath stone drainage layers.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. In order to prepare the building and pavement areas for fill or for insitu soils to be used as a final subgrade, the site shall be stripped of all vegetation, soft or loose surface soils, obstructions and all deleterious materials. This includes any loose or water-softened surface materials.
1. When trees are removed, the entire root ball shall be excavated such that the remaining roots measure 1/2 inch in diameter, or less.

2. Strip 6 inches of topsoil minimum at building pad and within 10 feet of the building. Additional stripping may be required in some areas. The actual removal depth shall be determined in the field by the Testing Agency.

C. Additional information for preparation requirements of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface, and treatment or improvement are specified in Division 2 Section "Site Preperation."

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

E. If unstable subgrade is encountered after initial topsoil stripping, the Architect or Testing Agency may require the grading contractor to perform processing and drying of the upper maximum 12 inches of native subgrade by frequent windrowing with a dozer or plowing with a set of heavy duty disc harrows for at least three consecutive working days to achieve stable conditions for fill placement before consideration other mitigation approaches. The windrowing and drying effort shall be performed during a period with at least three consecutive days forecasted to be dry. The processed areas shall be sealed with the dozer at the end of the day in case of unanticipated overnight rain. The subgrade drying effort described above shall be included in the base bid.

F. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated materials as directed by Architect.

G. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction (including all OSHA requirements). Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

H. See Section 3.7 below for required proofroll of existing subgrade to be performed immediately after preparation work noted above is complete.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

B. Avoid opening excavations during inclement weather.

C. Excavations shall not have deleterious effects on adjacent foundations or structures. Sequence construction as required to avoid deep excavations adjacent to foundations or structures, or when deep excavations adjacent to foundations or structures are unavoidable, provide temporary shoring as required in consultation with Geotechnical Engineer.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
   2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
   3. The base of all excavations for structures shall be free of water, loose soil, unsuitable bearing materials including soft soil, and other foreign materials.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipes and conduit less than 8 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
   2. For pipes and conduit 8 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill. Alternatively, excavate the trench 6” deeper than the bottom of the pipe and provide 6” bedding course.

3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.7 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll existing subgrade (after preparation as noted above has been completed) below the building slabs with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Contact Architect, Engineer, and Testing Agency 48 hours prior to proof- rolling. A representative of the Testing Agency must be on site during proof-rolling operations.
   2. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   3. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
   4. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Testing Agency and as directed by Architect, and replace with compacted backfill or fill as directed.
      a. Prior to consideration of removal and replacement of existing soils, drying and processing of existing subgrade for three consecutive dry days shall be performed as described in Section 3.1 and existing subgrade shall be retested by proof-roll immediately after drying and processing period is complete.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2000 psi, may be used when approved by Architect.
   1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with a lean concrete fill to elevation of bottom of footings. Provide a lean concrete fill with a 28-day compressive strength of 2500 psi.

D. Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

E. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
   1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

G. Place and compact final backfill of satisfactory soil to final subgrade elevation.

H. All utility trenches that penetrate the building shall be effectively sealed to restrict water intrusion and flow through trenches that could migrate below the building. An effective clay “trench plug” that extends at least five (5) feet out from the face of the building exterior shall be constructed at each utility trench which penetrates the building perimeter. The plug material shall be a clay satisfactory soil compacted at a water content at or above the soils optimum water content. The clay satisfactory soil shall be placed to completely surround the utility line and be compacted.

I. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:
   1. Under steps and ramps, use satisfactory soil material.
   2. Under building slabs (and within 10 feet of building slab edges), use satisfactory soil material.
   3. Under footings and foundations, use satisfactory soil material

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within -2 to +3 percentage points of the optimum moisture content at time of compaction as determined by the Standard Proctor test (ASTM D 698
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds the optimum moisture content allowance stated above and is too wet to compact to the specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials only after the site has been proof-rolled.

B. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

C. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

D. Compact all satisfactory soil materials to at least *Terracon*] [95 percent of the maximum dry density as determined by the Standard Proctor compaction test (ASTM D 698).

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
   3. Compact grading fill materials outside of building slab limits to at least 90 percent of the maximum dry density as determined by the Standard Proctor compaction test (ASTM D 698).

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Subgrade shall be inspected by Testing Agency after compacted fill is complete and immediately prior to placement of drainage course.

B. Provide a drainage course using granular material as defined in part 2 of this specification.

C. Place drainage course on subgrades free of mud, frost, snow, or ice.

D. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends. Geotextile fabric is only required for a sand drainage layer.
   2. Place drainage course 6 inches or less in compacted thickness in a single layer.
   3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   4. Compact each layer of drainage course to a minimum relative density of 75 percent as per ASTM D4253.

3.17 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
   2. Determine that fill material and maximum lift thickness comply with requirements.
   3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

C. Provide inspections and test in accordance with Chapter 17 of the International Building Code.

D. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

E. Testing agency will test compaction of soils in place according to ASTM D 1557, ASTM D 2167, ASTM D 2922, ASTM D 2937 and ASTM D 698, as applicable. Tests will be performed at the following locations and frequencies:
   1. Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of building slab area, but in no case fewer than 3 tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 100 feet or less of trench length, but no fewer than 2 tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

G. Testing agency shall verify materials below shallow foundations are adequate to achieve the design bearing capacity.

3.18 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect (or Engineer); reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off of Owner's property.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Grade beams
   2. Slabs-on-grade.

B. Related Sections include the following:
   1. Division 02 Section "Earthwork – Building Pad" for drainage fill under slabs-on-grade.

C. Cementitious Materials: Portland cement. None of the following are allowed in any concrete in this project: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

D. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 SUBMITTALS

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

B. Design Mixtures: Submit a design mixture for each concrete mixture, proportioned on the basis of field experience or trial mixtures, or both, as required by ACI 318-14, chapter 26. Evidence of the ability of the proposed mixture to comply with concrete mixture requirements on the Drawings shall be included. The evidence shall be based on field test records or laboratory trial batches. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amount of mixing water to be withheld for later addition at Project site. The amount of water withheld shall not exceed five percent (5%) of the total batch water.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing but not limited to 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. Reproductions made from contract drawings will not be accepted. Submit one (1) electronic print. Review of shop drawings by the Engineer will be for general compliance with contract documents.

D. Field quality-control test and inspection reports.

E. The scope of the above submittals shall only include the items covered by this Section. Do not include items covered by other Sections such as site paving product data, site paving design mixtures, or site paving steel reinforcement shop drawings.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site (with video teleconferencing capabilities) and verify acceptable date with Architect and Engineer a minimum of one week prior to scheduling.
   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Concrete Subcontractor.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs qualified personnel on the Project, Flatwork Technicians with at least three (3) years experience, Finishers with at least three (3) years experience and a Supervisor with at least ten (10) years experience in concrete finishing and flatwork.

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.

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, as documented according to ASTM E 548.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 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 one source, and obtain admixtures through one source from a single manufacturer.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specification for Structural Concrete for Buildings,"
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
   3. ACI 318, “Building Code Requirements for Structural Concrete.”

F. Concrete Testing Service: Owner shall engage (and pay for) a qualified independent testing agency to perform material evaluation tests. Contractor shall engage and pay a qualified independent testing agency to design concrete mixtures.

G. Materials and installed work may require testing and retesting, as directed by Architect, at anytime during progress of work. Allow free access to material stockpiles and facilities. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

H. For all concrete placement events, all steel reinforcement, other embedded items, and formwork shall be set and finalized a minimum of (3) three hours prior to the time of initial concrete placement to allow time for proper observation/inspection by the design team and the testing agency and time for resolution of any discrepancies.

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. Waterstops (if required): Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Forms for Exposed 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.
      a. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Forms for Unexposed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
   1. Form foundation elements as indicated on contract documents (typically placed in general notes of the structural plans).

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Chamfer Strips (if required): Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. 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.

F. 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.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

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

B. Plain-Steel Wire: ASTM A 82.

C. Deformed-Steel Wire: ASTM A 1064.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.

E. Deformed-Steel Welded Wire Reinforcement: ASTM A 1064, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars (if required): ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. 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 or weather where legs of wire bar supports contact forms (or occur within 1-1/2 inches of surface), use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use either of the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C 150, Type I/II unless otherwise acceptable to Architect.
   2. Blended Hydraulic Cement: ASTM C 595, Type IL (10), 10% limestone substitution.

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
   1. Maximum Coarse-Aggregate Size: 1 inch nominal for regular sand and gravel mixtures.
   2. Maximum Coarse-Aggregate Size: 0.5 inch nominal for sand and pea gravel mixtures. Use a #8 stone aggregate gradation per ASTM C 33 for pea gravel aggregate.
   3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable. Clean and not detrimental to concrete.

2.5 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/C 494M, Type A.
   2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 WATERSTOPS

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Carlisle Coatings & Waterproofing Inc; MiraSTOP.
      b. CETCO; Volclay Waterstop-RX.
      c. Concrete Sealants Inc.; Conseal CS-231.
      d. Greenstreak; Swellstop.
      e. Henry Company, Sealants Division; Hydro-Flex.
      f. JP Specialties, Inc.; Earth Shield Type 20.

2.7 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape. The vapor retarder shall maintain a permeance of less than .01 perms as tested before and after mandatory conditioning tests (per ASTM E 1745 Section 7.1 and sub-paragraphs 7.1.2-5).
   1. Available Products:
      a. Fortifiber Building Systems Group; Moistop Ultra.
      b. Meadows, W. R., Inc.; Perminator.
      c. Raven Industries Inc.; Vapor Block.
      d. Reef Industries, Inc.; Griffolyn.
      e. Stego Industries, LLC; Stego Wrap.
   2. Refer to contract plan documents for minimum vapor retarder thickness in mils.
   3. Vapor proofing mastic: water vapor transmission rate per ASTM E 96 of 0.3 perms or lower.
   4. Seam tape: must have a water vapor transmission rate of 0.3 perms or lower in accordance with ASTM E 96

2.8 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

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

C. Water: Potable.

D. Curing compounds must be approved for use with types of floor finishes and sealers/hardeners specified in Contract Documents. Curing compound shall not interfere with bonding of floor covering. The following list of compounds does not indicate acceptance with the floor finishes utilized. Contractor shall only submit for approval curing compounds that are guaranteed not to interfere with bonding of any floor covering. Contractor assumes all responsibility for compliance of curing compounds with respect to this requirement.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
   1. Available Products:
      a. Ashford Formula
      b. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
      c. Burke by Edoco; Aqua Resin Cure.
      d. ChemMasters; Safe-Cure Clear.
      e. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; W.B. Resin Cure.
      f. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
      g. Euclid Chemical Company (The); Kurez DR VOX.
      h. Kaufman Products, Inc.; Thinfilm 420.
      i. Lambert Corporation; Aqua Kure-Clear.
      j. L&M Construction Chemicals, Inc.; L&M Cure R.
      k. Meadows, W. R., Inc.; 1100 Clear.
      l. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
      m. Symons Corporation, a Dayton Superior Company; Resi-Chem Clear Cure.
      n. Tamms Industries, Inc.; Horncure WB 30.
      o. Unitex; Hydro Cure 309.
      p. US Mix Products Company; US Spec Maxcure Resin Clear.
      q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
   1. Available Products:
      a. Ashford Formula
      b. Anti-Hydro International, Inc.; AH Clear Cure WB.
      c. Burke by Edoco; Spartan Cote WB II.
      d. ChemMasters; Safe-Cure & Seal 20.
      e. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Cure and Seal WB.
      f. Dayton Superior Corporation; Safe Cure and Seal (J-18).
      g. Euclid Chemical Company (The); Aqua Cure VOX.
      h. Kaufman Products, Inc.; Cure & Seal 309 Emulsion.
      i. Lambert Corporation; Glazecote Sealer-20.
      j. L&M Construction Chemicals, Inc.; Dress & Seal WB.
      k. Meadows, W. R., Inc.; Vocomp-20.
      l. Metalcrete Industries; Metcure.
      m. Nox-Crete Products Group, Kinsman Corporation; Cure & Seal 150E.
      n. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
      o. Tamms Industries, Inc.; Clearseal WB 150.
      p. Unitex; Hydro Seal.
      q. US Mix Products Company; US Spec Hydrasheen 15 percent
      r. Vexcon Chemicals, Inc.; Starseal 309.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips (if required): ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids**, [epoxy resin with a Type A shore durometer hardness of 80] [aromatic polyurea with a Type A shore durometer hardness range of 90 to 95]** per ASTM D 2240.

C. Bonding Agent (if required): ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene. **[EM TO CONSIDER USE ON STRUCTURAL SLABS AND COMPOSITE SLABS AT CONSTRUCTION JOINTS]**.

D. Epoxy Bonding Adhesive (if required): 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, and as follows:
   1. Provide material "type", "grade" and "class" to suit project requirements.

E. Reglets (if required): Fabricate reglets of not less than 0.0217-inch- thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots (if required): Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

A. Repair Underlayment (if required): 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 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment (if required): 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 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.

2.11 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 0.06 percent by weight of cement.

C. The design mixtures for all exterior, exposed concrete shall provide a minimum of 4.5 percent entrained air.

D. 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.
      a. Do not use high-range water-reducing or super plasticizing admixtures in slabs.
   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, and concrete required to be watertight.
   4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
   5. If more than one admixture is used in a concrete mix, assure that only compatible admixtures are used.
   6. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
      a. This requirement does not apply to lightweight concrete.
      b. Air content for lightweight concrete shall comply with any fire-rated assembly requirements listed by Architect.

E. Maximum W/C Ratio: 0.50 and as required to achieve specified concrete strength.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Design mixes to provide concrete with the properties as indicated on the structural drawings.

2.13 FABRICATING REINFORCEMENT

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

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information. The time concrete is unloaded shall be recorded on each batch ticket.
   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.
   2. Batch ticket information shall include information necessary to calculate total mixing water and the amount of water added by the receiver.

B. Project-Site Mixing is not allowed.

PART 3 - EXECUTION

3.1 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 117 and ACI 347R as abrupt or gradual, as follows:
   1. Class A, 1/8 inch for smooth-formed finished surfaces.
   2. Class C, 1/2 inch for rough-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, unless otherwise indicated.

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.

3.2 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 and secure anchor rods prior to placing of concrete.
   3. 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.
   4. Install dovetail anchor slots in concrete structures as indicated.
   5. Provide additional rebar if required to secure rebar dowels in proper location.

B. Do not run any mechanical/electrical/plumbing pipes or conduit horizontally through concrete slabs, unless approved by the Engineer. These items shall also not bear continuously along grade beams and shall only cross perpendicular over top of grade beam in the concrete thickness below the slab at isolated locations.

C. Do not run any mechanical/electrical/plumbing pipes or conduit through concrete footings unless approved by the Engineer. All mechanical/electrical/plumbing items shall be routed to avoid conflicts with concrete construction.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, 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, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
   1. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

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 Architect.

3.4 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
   1. If vapor barrier is installed before the grade beam pour, seal vapor barrier to the inside face of grade beams along the entire vapor barrier perimeter using tape with a surface that creates a mechanical seal to freshly-placed grade beam concrete, per manufacturer's instructions.
   2. If vapor barrier is installed after the grade beam pour, seal vapor barrier to the inside face of grade beams along the entire vapor barrier perimeter using tape and termination bar per manufacturer’s instructions. Ensure the grade beam surface is clean and dry prior to adhering tape.
   3. Lap joints 6 inches and seal with manufacturer's recommended tape.
   4. Repair damaged areas by cutting patches of required vapor retarder, overlapping damaged area 6 inches and taping all four sides with approved tape.
   5. Seal all penetrations (including pipes) per manufacturer’s instructions.
   6. The vapor retarder shall be sealed at the perimeter.

3.5 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.
   1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Maximum spacing of bar supports for slab/mat reinforcement shall be 48 inches on center or less as required to secure reinforcement during construction operations.

E. Precast concrete blocks shall only be used to support reinforcement from the ground. Concrete blocks shall not be used for support of top reinforcement in concrete slabs or mats.

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

G. Install bar reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap ends of bars **per ACI standard lap as indicated on the structural contract drawings**.

H. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces as specified on drawings or a minimum of two full mesh if not otherwise specified. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.6 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 Architect.
   1. Place joints perpendicular to main reinforcement. Do not continue reinforcement through sides of strip placements of floors and slabs (unless noted otherwise on drawings).
   2. Form joints as indicated on drawings. Do not use metal keyways
   3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
   6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces, where indicated on drawings.
   7. Construction joints shall not be placed in any slab areas with floor coverings prone to cracking, unless written approval is provided the Architect. When construction joints are allowed in slab areas with floor coverings prone to cracking, the contractor shall assure that joints are properly considered in floor covering installation as required to prevent reflective cracking.

C. Doweled Joints (as indicated on drawings): Install dowel bars and support assemblies at joints where indicated.

3.7 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.
   1. Place at locations indicated on plans.
   2. Place at concrete construction joints below site grade in order to avoid water intrusion into interior space.
      a. Place at wall to slab (or mat foundation) joints below site grade.
      b. Place at wall to wall joints below site grade.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
   1. All embedded items, including anchor bolts, rebar dowels, etc., shall be set prior to placement of concrete.
   2. For foundation elements, verify that water is not present in the excavation prior to placement of concrete.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 and in accordance with ASTM C94.
   1. Determine initial slump prior to any water addition at Project site and before any significant concrete discharge.
   2. Measure and record water added on Project site and resulting slump.
   3. The amount of water added shall not exceed the amount allowed in the approved design mixture.
   4. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
   5. Do not exceed specified W/C ratio or slump per approved design mixture.
   6. Do not add water to concrete delivered in equipment not acceptable for mixing.
   7. Do not add water if more than 0.25 cubic yards of concrete has already been discharged from the mixer.
   8. All water added shall be under the pressure and direction of flow required to achieve uniformity in concrete. Immediately after addition of water, the drum or blades of the truck mixer or agitator shall be turned an additional 30 revolutions or more if necessary, at mixing speed, until uniformity of concrete is achieved.

C. 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.

D. 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.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not place concrete when temperature is 36 deg F or below or if temperature is expected to reach 36 deg F (or below) within 12 hours of the anticipated time for completing a concrete pour.
3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301, ACI 305R, 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.

G. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: (For formed concrete surfaces not exposed to view) As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: (For formed concrete surfaces exposed to view) As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Consult with Project Architect to determine the type of rubbed finish prior to pouring of concrete. Apply one of the following to smooth-formed finished as-cast concrete as indicated or directed by Architect:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General:
1. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
2. See architectural drawings for slab finish requirements or consult the Project Architect if finishes have not been supplied on the architectural drawings.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
1. Apply scratch finish to surfaces to receive concrete floor toppings and to receive mortar setting beds for 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 receive trowel finish and 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 troweling 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, 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.
a. Finish surfaces to the following tolerances, see structural drawings

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
   1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
   2. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
   1. Uniformly spread dampened slip-resistive aggregate over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
   2. After broadcasting and tamping, apply float finish.
   3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. 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. 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.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. 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.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. 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. 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 Project.

3.13 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 one 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, unless noted otherwise in documents. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect'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 in solid concrete, but not less than 1 inch in depth. 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 Architect.

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 Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Provide special inspections in accordance with Chapter 17 of the International Building Code for concrete construction.

B. Inspections:
   1. Steel reinforcement placement.
   2. Verification of use of required design mixture.
   3. Mixing and delivery time for concrete.
      a. Record the time batched, time arrived, and the time unloaded for each batch of concrete.
   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.

C. 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.
      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.
   2. Slump: ASTM C 143/C 143M; one test at point of discharge 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 or is questionable.
      a. Determine initial slump prior to any water addition to concrete at Project site and before any significant concrete discharge.
      b. Measure and record water added to concrete on Project site and resulting slump.
      c. Record amount of water indicated on batch ticket allowed to be added.
   3. 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.
   4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. 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.
   6. Compression Test Specimens: ASTM C 31/C 31M.
      a. Cast and laboratory cure five standard cylinder specimens for each composite sample.
      b. Testing Agency shall be responsible for providing curing container for composite samples on Site as required for initial curing period and verifying that standard-cured composite samples are cured in accordance with ASTM C31/C31M. Testing Agency shall document method of initial curing.
      c. The Contractor shall provide secured space, electrical power, and access for initial curing of test specimens.
   7. Compressive-Strength Tests: ASTM C 39/C 39M.
      a. Test one specimen at 7 days, three specimens at 28 days, and hold one specimen for testing at 56 days, if necessary.
      b. A compressive-strength test shall be the average compressive strength from a set of three specimens obtained from same composite sample and tested at age indicated.

8. 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.
9. Test results shall be reported in writing to Architect, 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 (illustrated via highlighting of elements on structural plans), design compressive strength at 28 days, concrete mixture proportions and materials, concrete unit weight, compressive breaking strength, and type of break for both 7- and 28-day tests. Deviations from the requirements of the Contract Documents shall be clearly identified and described on the reports.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. 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 Architect. 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 Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness, per requirements on drawings, according to ASTM E 1155 within 72 hours of finishing.

END OF SECTION

SECTION 04100
MORTAR

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Mortar and grout for unit masonry.

B. Grout for hollow metal frames.

1.02 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement: ASTM C150, normal-Type I.

B. Masonry Cement; ASTM C91, for general use.

C. Mortar Aggregate: ASTM C144, standard masonry type; clean, dry, protected against dampness, freezing, and foreign matter.

D. Grout Course Aggregate: Specifications for aggregates for masonry grout ASTM C404.

E. Grout Fine Aggregate: Specification for masonry mortar ASTM C144, except that all sand for mortar in 1/4" joints shall pass a no. 16 sieve.

F. Hydrated Lime: ASTM C207, Type S.

G. Water: Clean and potable.

2.02 MIXES

A. Mortar for Non-load Bearing Walls and Partitions: ASTM C270, Type N.

B. Mortar for load bearing walls and *for moisture resistant CMU* ASTM C270, Type S.
(None anticipated for this project)

C. Premixed custom color mortar for exterior brick veneer: ASTM C91: ***Color to match building.***

2.03 MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.

B. Do not use anti-freeze compounds to lower the freezing point of mortar or grout.

C. If water is lost by evaporation, retemper within two hours of mixing. Do not retemper mortar after two hours of mixing.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install mortar and grout in accordance with 04300.

B. Work grout into cores and cavities to eliminate voids.

C. Do not displace reinforcing steel when placing grout.

D. Clean concrete grout spaces of excess mortar and debris.

E. Grout jambs only of hollow metal frames for doors and other openings.

END OF SECTION

SECTION 04300
MASONRY

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnishing and installing brick masonry where noted and shown on the drawings.

B. Coordinate work with steel framing, flashing installation and other trades with piping, conduit or equipment set in block wall.

C. See Section 04220 - Concrete Masonry Units for requirements of CMU.

1.02 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements - IMIAC - Recommended Practices and Specifications for Cold Weather Masonry Construction.

1.04 MOCKUP

A. Provide mockup under provision of Section 01400 if requested by Architect.

1.05 CERTIFICATES

A. Submit manufacturer's certificates under provisions of Section 01400.

B. Submit manufacturer's certificate and concrete masonry materials meet or exceed specified requirements.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Cold Weather Requirements: Masonry units, mortar, and grout shall be preconditioned and masonry protected as follows.
   1. Average daily temperature between 40 degrees and 32 degrees F: Heat mixing water or aggregate to minimum 70 degrees F, to maximum 160 degrees F; protect masonry from precipitation for 24 hours.
   2. Do not conduct masonry operations when temperature is at or expected to go below 32 degrees F within 24 hours.

PART 2 - PRODUCTS

2.01 BRICK

A. Face brick shall ***match face brick in all respects including but not limited*** to size, color, shape, texture, etc. meeting ANSI/ASTM C216, Type FBS Grade SW .

2.02 REINFORCEMENT AND ANCHORAGES

A. *For single story application in this project 16 gage galvanized straps are approved for bidding, Heckmann #260 (7" X7/8" corrugated) or Hohmann & Barnard (3/4 inch flat, 12 gage hot dipped*

galvanized strap); Welding model for use at columns, screw model for wood stud attachment.

2.04 CONTROL JOINT MATERIAL

B. Slot Seal shall be equal to Everlastic 2015-3, HB RS Series extruded rubber conforming to ASTM D-2000 2AA-805.

2.05 MASONRY AIRSPACE MAINTENANCE

A. Masonry Mats will not be used on this project. Contractor will keep the air space clear as noted in execution below.

B. Weep Vent Material shall be CavClear Weep Vents or equal. Material is a non-woven mesh with M notched bottom in color to match mortar (color to be selected by Architect).

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify items provided by other Sections of work are properly sized and located.

B. Establish lines, levels, and coursing. Protect from disturbance.

C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.

3.02 COURSING

A. Place masonry to lines and levels indicated.

B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.

3.03 PLACING AND BONDING

A. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints and deep or excessive furrowing of mortar joints are not permitted.

B. Fully bond intersections, and external and internal corners.

C. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.

D. Remove excess mortar.

E. Perform job site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.

F. Provide masonry control joints as indicated on drawings. Provide at a maximum spacing of 40' - if not shown, locations will be made available by Architect.

3.04 CAVITY OR VENEER WALLS

A. Do not let mortar fall into cavity air space or plug weep holes. Clean out promptly.

B. Install cavity vents and weep holes in veneer at 24" on center horizontally above through-wall flashing at shelf angles and at bottom of walls.

3.05 TOLERANCES

A. Alignment of Columns: Maximum 1/4 inch from true line.

B. Variation from Unit to Adjacent Unit: 1/32 inch maximum.

C. Variation from Plane of Wall; 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

D. Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.

F. Variation of Joint Thickness: 1/8 inch in 3 feet.

G. Maximum Variation from Cross Sectional Thickness of Walls: Plus or minus 1/4 inch.

3.06 REINFORCEMENT AND ANCHORAGES

A. Multiple and Single Wythe joint reinforcement.

B. Install horizontal joint reinforcement 16 inches oc.

C. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 16 inches each side of opening.

D. Place joint reinforcement continuous in first and second joint below top of walls.

E. Lap joint reinforcement ends minimum 6 inches. Extend 16 inches minimum each side of opening.

F. Place reinforcing bars supported and secured against displacement. Maintain position within 1/2 inch of true dimension.

G. Verify that anchorages embedded in concrete and attached to structural steel members are properly placed. Embed anchorages in every second joint.

H. Wall ties - Weld to structural steel members 16 inches oc vertically.

3.07 LINTELS

A. Install loose steel lintels over all window and door openings where indicated.

3.08 CONTROL JOINTS

A. Do not continue horizontal joint reinforcing across control joints.

B. Provide control joints where shown on drawings. If not shown on drawings provide for control joints at 40' maximum spacing for brick. Review layout and verify locations with Architect on job.

3.09 BUILT-IN WORK

A. As work progresses, build-in metal door frames, reinforcing, flashings, wood nailing strips, anchor bolts, plates, and other items to be built in the work supplied by other Sections.

B. Build-in items plumb and level.

C. Do not build-in organic materials subject to deterioration.

3.10 CUTTING AND FITTING

A. Cut and fit for chases, pipes conduit, sleeves, grounds and other items which effect masonry. Cooperate with other Sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.11 CLEANING

A. Remove excess mortar and smears.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with a non-acidic solution which will not harm masonry or adjacent materials. Consult masonry manufacturer for acceptable cleaners.

D. Use non-metallic tools in cleaning operations.

3.12 PROTECTION

A. Protect finished installation under provisions of Section 01500.

B. Maintain protective boards at exposed exterior corners which may be damaged by construction activities.

C. Provide protection without damaging completed work.

D. At day's end, cover unfinished walls to prevent moisture infiltration.

END OF SECTION

SECTION 05999
MISCELLANEOUS METALS

PART 1 GENERAL

1.01 WORK INCLUDED

A. All labor, materials and equipment necessary to complete work specified herein.
   1. Include miscellaneous iron and steel, lintels, plates, anchors, bolts, and attachments of every description for installation and connection to other materials, whether or not specifically shown on drawings or specified.
   2. All miscellaneous metals and related items required to complete work, if not mentioned on drawings or specified in any other section of this specification.
   3. Fabricate and furnish for installation under other sections all other miscellaneous metal items, including all exterior and interior lintels and/or shelf angles for masonry support over window, doors, louvers, metal duct penetrations at all walls and/or partitions, etc.
   4. Miscellaneous structural steel, shapes and fabrications.

1.02 REFERENCE STANDARDS

A. ASTM A 36 - Structural Steel.
B. ASTM A 307 - Low Carbon Steel - Externally and Internally Threaded Fasteners.
C. AWS D1.1 - Structural Welding Code.
D. FS TT-P-16208/7200 - Lead and Zinc-Chromate Free Primer, Ready Mixed.
E. FS TT-P-645 - Primer, Paint Zinc-chromate, Alkyd Type.
F. ASTM B 221-69 - Alloy 6063-T5 - Miscellaneous Aluminum.
G. ASTM A 153-67 - Hot dipped galvanized anchors and fastenings.
H. ASTM A 167-70 - Stainless steel plate, sheet or strip Type 302 or 304.
I. ASTM A 48, Class 30 - Miscellaneous iron castings.
J. ASTM B 749 - Sheet lead.

1.03 SUBMITTALS

A. Shop Drawings: Submit as per Section 01300.
   1. Submit complete shop drawings Architect's review before fabrication.
   2. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories.
   3. Include erection drawings, elevations and details where applicable.
   4. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver products in original sealed and labeled containers.

B. Store products in clean area. Protect products from damage. Damaged products shall not be used.

1.05 JOB CONDITIONS

A. Protection:
   1. Protect adjoining work during installation.
   2. Protect installed products until contract acceptance.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Primers for steel:
1. Glidden Paint Company NuPon Cote Primer LCF Red
2. Tnemec 66-1211 Epoxy Primer
3. Substitutions may be submitted as outlined in Instructions to Bidders and Section 01600.

2.02 MATERIALS

A. Miscellaneous structural steel shapes and fabrications: ASTM A 36.

B. Steel Tubing: ASTM A500, Grade B, ASTM A501 or ASTM A53

C. Connection bolts: ASTM A 307
1. Finish: Hot dipped galvanized.

D. Miscellaneous iron castings: ASTM A 48, Class 30.

E. Miscellaneous aluminum: ASTM B 221, Alloy 6063-T5.
1. Finish: Caustic etch and lacquered for miscellaneous aluminum not designated to be finished otherwise.

F. Stainless steel: ASTM A 167, Type 302 or 304.

G. Miscellaneous anchors and fastenings: Compatible with material to be fastened.

H. Isolator for aluminum and galvanized metal: Aluminum pigmented bituminous paint.

I. Sheet steel: Prime grade, cold rolled annealed and leveled.

J. Galvanized steel: Hot dip, minimum coating of two (2) ounces per square foot, Dip after fabrication.

K. Materials shall be new, free from defects impairing strength, durability or appearance and of best commercial quality for intended purposes.

L. All steel installed in exterior walls, exposed to weather or in direct contact with concrete or masonry shall be hot dipped galvanized after fabrication. (Reinforcing bars in concrete excluded.)

2.03 BASIC FINISHES

A. Galvanizing: Scheduled fabrications shall be hot dipped galvanized after fabrication in accordance with the Standard Specifications of the American Hot Dip Galvanizers Association for the type of work required. Members indicated shall receive a heavy hot dip zinc coating with a minimum of 2 ounces of zinc per square foot of metal surface. The coating shall have a reasonable uniform thickness, free of dross or uncoated spots.

B. Shop painting: All steel, other than galvanized, shall receive one shop coat of metal primer. Prior to painting all surfaces shall be clean and dry. All dirt, rust and loose mill scale shall be removed by scraping and wire brushing, sand blasting, or other suitable means. Apply metal primer in accordance with manufacturer's recommendations.

C. Stainless steel: No. 4 finish.

PART 3 EXECUTION

3.01 FABRICATION

A. Verify dimensions on site prior to shop fabrication.

B. Fabricate items with joints neatly fitted and properly secured.

C. Fit and shop assemble in largest practical sections, for delivery to site.

D. Grind exposed welds smooth and flush with adjacent finished surfaces.

E. Exposed mechanical fastenings: Flush countersunk screws or bolts unobtrusively located consistent with design of structure, except where specifically noted otherwise.

F. Make exposed joints flush butt type hair line joints where mechanically fastened.

G. Supply components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, unless otherwise specified in Schedule herein.

H. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to prime painting.

3.02 ERECTION

A. Install items square and level, accurately fitted and free from distortion or defects.

B. Make provision for erection stresses by temporary bracing. Keep work in alignment.

C. Replace items damaged in course of installation.

D. Perform field welding in accordance with AWS D1.1

E. After installation, touch-up field welds and scratched and damaged primed painted and galvanized surfaces. Use a primer consistent with shop coat. Use a primer recommended for galvanized surfaces. See Section 09900 -Painting.

F. Supply to appropriate sections, items requiring to be cast into concrete, or embedded in masonry complete with necessary setting templates.

G. Follow reviewed erection drawings. Coordinate with work of Division 3 for items cast into concrete.

H. Isolate galvanized surfaces in contact with other surfaces with two (2) coats of specified paint.

I. Isolate galvanized surfaces to be cast into concrete with two (2) coats of specified paint.

J. Erect all work, straight, plumb and in alignment.

END OF SECTION

SECTION 06001
CARPENTRY

PART I - GENERAL

1.01 WORK INCLUDED

A. Rough carpentry, finish carpentry, wood paneling, and cabinet work. Refer to Schedule located at the end of this Section.

B. Plastic Laminate and Non-porous polymer surfaces.

C. Cabinet Hardware.

1.02 RELATED WORK

A. Section 08712 - Hardware: Supply of cabinet hardware as required for this Section.

B. Section 09900 - Painting: Site finishing of finish carpentry and cabinetwork.

1.03 REFERENCES

A. PS 1 - Construction and Industrial Plywood.

B. PS 20 - American Softwood Lumber Standard.

C. PS 51 - Hardwood and Decorative Plywood.

D. PS 58 - Basic Hardwood.

E. NFPA - National Design Specification for Wood Construction.

F. AWI - Architectural Woodwork Institute.

1.04 QUALITY ASSURANCE

A. Rough Carpentry Lumber: Visible grade stamp, of agency (American Lumber Standards Committee Board of Review, certified by National Forest Products Association (NFPA). Inspection agencies include SPIB Southern Pine Inspection Bureau, WCLIB West Coast Lumber Inspeciton Bureau and WWPA Wester Wood Products Association.

B. When applicable, fabricate cabinetwork and site made finish carpentry items in accordance with recommendations of Quality Standards of Architectural Woodwork Institute (AWI) Premium Grade unless specifically noted otherwise.

C. AWPA - American Wood Preservers Association Book of Standards

D. Factory-mark each piece of lumber and plywood to identify type, grade, moisture content, agency providing inspection service, producing mill and other qualities specified. Marking may be omitted if certificate of inspection is provided for each shipment.

E. Do not use wood treatment materials or processes which will, in any way, bleed through or otherwise adversely affect applied finish materials.

F. Do not use wood treatment materials or processes which will react with or adversely affect roofing materials.

G. Requirements of Regulatory Agencies: Fire Hazard Classification: Underwriters' Laboratories, Inc. (UL) for fire-treated lumber and plywood.

H. Preservative treated material: American Wood Preservers Bureau (AWPB) Standards and Quality Mark.

I. Plywood Standards: US Product Standard for Construction and Industrial Plywood of American Plywood Association.

1.05 SUBMITTALS

A. Submit shop drawings under provisions of Section 01300.

B. Indicate dimensioned plans and elevations, large scale details, attachment devices, materials, and other components.

C. Submit samples under provisions of Section 01300 of standard colors and patterns of plastic laminate for Architect’s selection.

D. Wood Treatment Data: For information only, submit 2 copies of chemical treatment manufacturer's instructions for proper use of each type of treated material. Indicate by transmittal form that copy of each instruction has been distributed to the Installer.

E. Dip treatment: For each type specified, include certification by treating plant stating chemical solutions used, submersion period and conformance with specified standards.

F. Pressure Treatment: For each type specified, include certification by treating plant stating chemicals and process used, net amount of salts retained and conformance with applicable standards.

G. For water-borne preservatives, include statement that moisture content of treated materials was reduced to a maximum of 15% prior to shipment to project site.

H. Fire-Retardant Treatment: Include certification by treating plant that treatment materials comply with governing ordinances and that treatment will not bleed through finished surfaces.

I. Samples: Carpentry: Submit 3 samples of each wood material which is to receive transparent or natural finish. Submit 12 inch long samples of full member width and thickness for solid lumber, and 12 inch long x 6 inch wide for plywood. Samples will be reviewed by Architect for appearance only. Compliance with all other requirements is exclusive responsibility of the Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver shop fabricated carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit.

B. Store indoors, in ventilated areas with a constant, minimum temperature of 60 degrees F, maximum relative humidity of 25 to 55 percent.

PART 2 - PRODUCTS

2.01 ROUGH CARPENTRY MATERIALS

A. Lumber: PS 20; graded in accordance with established Grading rules; maximum moisture content

of 15 percent:

B. Nails, Spikes and Staples: Galvanized for exterior locations, high humidity locations and treated wood; plain finish for other interior locations; size and type to suit application.

C. Bolts, Nuts, Washers, Lags, Pins and Screws: Medium carbon steel; sized to suit application galvanized for exterior locations, high humidity locations and treated wood; plain finish for other interior locations.

D. Fasteners: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolts or power activated type for anchorage to steel.

E. Plywood: Comply with requirements of PS I-66, exterior type, A Grade on exposed faces, and C Grade on concealed faces. Where shown, provide exterior type plywood with medium density overlay exposed faces. **Roof sheathing shall be 5/8 inch exterior Grade.**

2.02 FINISH CARPENTRY

A. Hardwood Lumber: Graded in accordance with AWI; maximum moisture content of six percent; of the following species and grades. (Falme Spread Classification: Class C typical.)

Item	**Species**	**Grade**	**Veneer Cut**
Wood Trim:	Red Oak	Grade 1 -Premium	Plain Sawn
Wood Trim @ Paneling:	Red Oak	Grade 1 - Premium	Rift-Cut

B. Plywood concealed from view in cabinet construction shall be B-B grade fir or pine. Plywood shall be laminated wood core veneer.

C. Exposed wood on all cabinets and millwork items shall be premium grade, plain sliced red oak, select as to color.

Plywood concealed from view in cabinet construction shall be B-B grade fir or pine.

Doors shall be premium grade red oak veneer covering and shall be solid core and comply with AWN-1 grade. No particle board is to be used.

D. Hardwood Plywood: PS 51: graded in accordance with AWI; wood core material of veneer; lumber; type of bond recommended for application; of the following species,grades and face veneer cuts.

Wood Paneling: Species - Red Oak
Grade - Grade 1 - Premium
Veneer Cut - Rift-Cut with Combed grain.
Flame Spread Classification - Class C (NFPA)

E. Plastic Laminate: General purpose type; minimum 1/16" inches thick; installed on 3/4" exterior grade plywood with all edges self-edge. The use of metal trim with plastic laminate installation is prohibited. Color shall be selected by Architect or to match existing. (All laminate unless noted otherwise.)

F. Non-porous polymer surface only as indicated on Drawings: (Corian are approved equal.))
1. Thickness: as indicated on drawings
2. Color: as selected by Architect.
3. Manufacturer: **Corian -** All others require prrior approval.
4. Finish: Matte, satin or high polish. (any combination)

G. Nails: Size and type to suit application.

H. Bolts, Nuts, Washers, Lags, Pins and Screws: Size and type to suit application.

2.03 CABINET HARDWARE

A. Items indicated are taken from the catalogs of the following manufacturers. All other manufacturers require pre-bid approval. See Section 01600 - Materials and Equipment Substitutions and Instruction to Bidders.
1. Knape & Vogt Mfg. Co. (K-V)
2. Stanley
3. The Engineered Products Co. (EPCO)
4. Grant Hardware Company
5. HDI, Inc.
6. Corbin Lock Company

B. Provide all items required to make woodwork function as per design. Submit brochures and samples for selections or approvals.

C. Finish: US 26D except where called for otherwise by model number.

D. To include:
1. Locks: Knape Vogt 986, Corbin 02067, Yale 9730. US 26D
2. Adjustable Shelf Hardware: Stanley 798/799, Knape Vogt 255, Grant 120/121. US 26D
3. Drawer Slides: Knape Vogt 1400, Grant 340, HDI 2900.
4. Catches: Stanley SP46
5. Pulls: 4" Wire - US 26D
6. Hinges: Stanley 335 - US 26D

2.04 WOOD TREATMENT

A. Preservative Treatment; Where lumber or plywood is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood) and of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.

B. Pressure-treat above ground items with water-borne preservatives complying with AWPB LP-2. After treatment, kiln-dry to a maximum moisture content of 15%. Treat indicated items and the following:

Wood cants, nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing,vapor barriers and waterproofing.

Wood blocking, furring, stripping and similar concealed members in contact with masonry or concrete.

Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment.

2.05 FABRICATION

A. Fabricate finish carpentry items in accordance with recommendations of AWI and to extent indicated in Schedule located at the end of this Section. Shop fabricate items where possible.

B. Fit shelves, doors and exposed edges with 3/8 inch thick matching hardwood edging. Use full length pieces only.

C. Cabinetwork Doors: Minimum 3/4 inch thick and of type construction indicated in Drawings.

D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Corners and joints to be hairline.

E. Cap exposed plastic laminate edges with material of same finish and pattern.

F. Shop assemble cabinetwork and finish carpentry items for delivery to site in sizes easily handled and to ensure passage through building openings.

2.06 FINISH CARPENTRY WORKMANSHIP:

A. Conform to design, details, and profiles shown for all interior and exterior millwork. Cut moldings and shapes sharp and true.

B. Blind nail where possible. Set finishing nails, used on exposed faces, to receive putty.

C. Install trim at openings in single length at each side. Install running trim in longest lengths practicable, with joints staggered and only where solid fastenings can be made.

D. Cope molded work at returns and interior angles. Miter at corners. Shop miters which are over 4" from heel to point shall be glued and locked.

E. Scribe, miter, and join accurately and neatly to detail.

F. Kerf backs of wide flat members.

G. Assemble work at mill where practicable, ready for erection. Where necessary to fit at project, make allowance for cutting and fitting.

H. Machine sand with grain in shop, and finish with had sanding, ready to receive paint with only the lightest touch-up sanding. Leave free from machine or tool marks that will show through finish. Leave work free from defects in any exposed parts.

I. Back prime all exterior finish carpentry members before installation with exterior priming material.

J. Install exterior finish carpentry with non-corrosive nails.

K. Dip treat exterior millwork and finish woodwork after final machining or assembly, except for that constructed of heart Redwood or Cedar. However, do not treat woodwork to receive penetrating stains.

L. Adhere to the applicable provisions of the “Quality Standards” of the Architectural Woodwork Institute, and their publication entitled “Architectural Woodwork: Moldings and Trim”.

2.07 PREPARATION OF FINISH CARPENTRY ITEMS AND CABINETWORK FOR FINISHING

A. Sand work smooth and set exposed nails and screws. Apply wood filler in exposed nail and screw indentations and leave ready to receive site applied finishes. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

B. Seal, stain and varnish concealed and semi-concealed surfaces. Brush apply only.

C. Preservative treat surfaces in contact with cementitious materials.

D. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from site dimensions. Prime paint, seal contact surfaces of cutouts.

E. Refer to Division 9 Sections for final finishing of installed cabinetwork.

PART 3 - EXECUTION

3.01 INSTALLATION OF FINISH CARPENTRY ITEMS AND CABINET WORK

A. Set and secure finish carpentry items in place rigid, plumb, and square.

B. Use purpose designed fixture attachments for mounted components.

C. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units, counter tops and overhead cabinets.

D. When necessary to cut and fit on site, make material with ample allowance for cutting. Provide trim for scribing and site cutting.

E. Permanently fix cabinet and counter bases to floor using appropriate angles and anchorages.

F. Counter-sink semi-concealed anchorage devices used to wall mount components and conceal with solid plugs of species to match surrounding wood. Place flush with surrounding surfaces.

G. Carefully scribe cabinetwork which is against other building materials, leaving gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

H. Install and adjust cabinet hardware to correct operation.

I. Install hardware, fixtures and accessories supplied under other Sections for installation. Install items in accordance with manufacturer's instructions.

J. Ensure that mechanical and electrical items affecting this Section of work are properly placed, complete, and have been inspected by the Architect prior to commencement of installation.

3.02 SHEATHING

A. Sheathing shall be installed over 5/8" exterior gypsum sheathing. **ONLY AS INDICATED ON DRAWINGS** (RE: Section 09260)

B. Secure roof sheathing perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing. Use sheathing clips between sheets between roof framing members. **Use recommended fastening devices for roof framing members.**

3.03 SCHEDULE

A. Rough Carpentry Work:
   1. Structural and non-structural framing.
   2. Miscellaneous blocking and canting for membrane roofing system and related metal flashing.
   3. Blocking and canting for roof mounted mechanical items.

B. Interior Finish Carpentry Work:
   1. Loose shelving.
   2. On-site constructed millwork; and installation of finish hardware; premium grade construction.
   3. On-site applied plastic laminate work.

4. Wood trim; wood crown molding; wood base molding; plinth blocks at doors; applied moldings to doors.

C. Cabinet Work:
   1. Cabinetwork; cupboards; shelving units. **(Only as indicated on Drawings)**

D. Hardwood Plywood:
   1. Wood Paneling **(Only as indicated on Drawings.)**

END OF SECTION

SECTION 06100
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Framing with dimension lumber and timber.
   2. Rooftop equipment bases and support curbs.
   3. Wood blocking, cants, and nailers.
   4. Wood furring.
   5. Utility shelving.
   6. Plywood backing panels.

B. Related Sections include the following:
   1. Division 6 Section “Sheathing”
   2. Division 6 Section “Shop-Fabricated Wood Trusses”

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. SPIB: The Southern Pine Inspection Bureau.

1.4 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 materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

C. Material Certificates: For dimension lumber and timber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

D. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
   1. Power-driven fasteners.
   2. Powder-actuated fasteners.
   3. Expansion anchors.
   4. Metal framing anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
   3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction.
   2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat items indicated on Drawings, and the following:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
   4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Non-Load-Bearing Interior Partitions: No. 2 grade and the following species:
   1. Southern pine; SPIB

C. Exterior and Load-Bearing Walls: No. 2 grade and the following species:
   1. Southern pine; SPIB.

D. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade and the following species:
   1. Southern pine; SPIB.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   3. Cants.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content and the following species:
   1. Southern pine; SPIB.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
   1. Where rough carpentry is in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts/Lag Screws: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
   1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
   2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.6 METAL FRAMING ANCHORS

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:

C. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:
   1. Alpine Engineered Products, Inc.
   2. Cleveland Steel Specialty Co.
   3. Harlen Metal Products, Inc.
   4. KC Metals Products, Inc.
   5. Simpson Strong-Tie Co., Inc.
   6. Southeastern Metals Manufacturing Co., Inc.
   7. USP Structural Connectors.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

E. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

2.7 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

D. Do not splice structural members between supports, unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

F. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. According to schedule on structural plans for common wire nails.

I. 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 between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

J. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
   1. Comply with approved fastener patterns where applicable.

K. All lag screws with diameters 3/8” and greater shall be installed using a lead hole with a diameter equal to 60% to 70% of the shank diameter. The lead hole length shall be equal to the length of the lag screw embedment. The threaded portion of the lag screw shall be inserted in it lead hole by turning with a wrench, not by driving with a hammer. The lead hole shall be centered on the lag screw location.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction, unless otherwise indicated.
   1. For exterior and interior load bearing walls, provide stud size and spacing as indicated on structural plans.
   2. For interior non-load bearing walls (including all partitions), provide 2-by-4-inch nominal-size wood studs spaced 16 inches o.c., unless otherwise indicated.
   3. For exterior and interior load bearing walls, provide blocking using members of 2-inch nominal thickness and of same width as wall. Provide blocking at frequency specified on structural plans.
   4. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
   5. Provide blocking using members of 2-inch nominal thickness and of same width as wall at locations of edges of sheathing for all exterior walls.

B. Construct corners and intersections with three or more studs.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
   1. For non-load-bearing partitions, if not indicated on plans, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
   2. For load-bearing walls, see structural drawings.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06160
SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Wall sheathing.
   2. Roof sheathing.

B. Related Sections include the following:
   1. Division 6 Section "Rough Carpentry" for framing and plywood backing panels.

1.2 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

2.1 WOOD PANEL PRODUCTS, GENERAL

A. Oriented Strand Board: DOC PS 2.

B. Plywood: DOC PS 1.

C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

D. Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

A. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing.
   1. Span Rating: Not less than 24/16.
   2. Nominal Thickness: Not less than 1/2 inch.

B. Plywood Wall Sheathing: Exposure 1 sheathing.
   1. Span Rating: Not less than 24/16.
   2. Nominal Thickness: Not less than 1/2 inch.

C. Paper-Surfaced Gypsum Wall Sheathing: ASTM C 1396/C 1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Gypsum.

b. G-P Gypsum Corporation.
c. LaFarge North America Inc.
d. National Gypsum Company.
e. Temple-Inland Inc.
f. United States Gypsum Co.

2. Type and Thickness: Type X, 5/8 inch thick.
3. Edge and End Configuration: s] [Square].

D. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
a. CertainTeed Corporation; GlasRoc.
b. G-P Gypsum Corporation; Dens-Glass Gold.
c. Temple-Inland Inc.; GreenGlass
d. United States Gypsum Co.; Securock.
2. Type and Thickness: Type X, 5/8 inch thick.

2.3 ROOF SHEATHING

A. Oriented-Strand-Board Roof Sheathing: Exposure 1 sheathing.
1. Span Rating: Not less than 48/24.
2. Nominal Thickness: Not less than 3/4 inch.

B. Plywood Wall Sheathing: Exposure 1 sheathing.
1. Span Rating: Not less than 48/24.
2. Nominal Thickness: Not less than 3/4 inch

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. For roof and exterior wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant Sheathing Board: Refer to Division 7 Section “Joint Sealants” for sealant compatible with dampproofing and roofing.

2.6 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Refer to architecture plans.

PART 3 - EXECUTION

3.1 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. According to schedule on structural plans for common wire nails.

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. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. 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.

3.2 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:
   1. Wall and Roof Sheathing:
      a. Nail to wood framing.
      b. Space panels 1/8 inch apart at edges and ends.

C. Sheathing nails or other approved sheathing connectors shall be driven so that their head or crown is flush with the surface of the sheathing.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.
   1. Fasten gypsum sheathing to wood framing with screws.
   2. Fasten gypsum sheathing to cold-formed metal framing with screws.
   3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
   4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. About ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
   1. Space fasteners approximately 7 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards or as indicated on structural plans.
   2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
   1. Space fasteners approximately 7 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards or as indicated on structural plans.
   2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

3.4 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.
   1. Apply sealant to joints and trowel flat. Apply sufficient quantity of sealant to completely cover joints after troweling. Seal other penetrations and openings.

3.5 PROTECTION

A. Wood Sheathing: Protect from delaminating or deteriorating until dampproofing is applied.

END OF SECTION

SECTION 06170
SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Wood roof trusses.
   2. Wood floor trusses.
   3. Wood girder trusses.
   4. Wood truss bracing.
   5. Metal truss accessories.

B. Related Sections include the following:
   1. Division 1 Section "Quality Requirements" for independent testing agency procedures and administrative requirements”

1.2 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

B. TPI: Truss Plate Institute, Inc.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. NeLMA: Northeastern Lumber Manufacturers' Association.
   2. NLGA: National Lumber Grades Authority.
   3. SPIB: The Southern Pine Inspection Bureau.
   4. WCLIB: West Coast Lumber Inspection Bureau.
   5. WWPA: Western Wood Products Association.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding minimum design requirements within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
   1. Design Loads: As indicated on drawings.
   2. Maximum Deflection Under Design Loads:
      a. As indicated on drawings for roof trusses for all spans of trusses, including cantilever overhangs.
      b. For 4x2 floor trusses
         1) Total Load = L/360
         2) Live Load = L/400
   3. All truss-to-truss connections shall be designed and provided by truss supplier.
   4. All truss-to-support connections shall be designed and provided by truss supplier, unless noted otherwise.
   5. All truss end verticals at exterior walls shall be designed for wind pressure in accordance with wind design criteria provided on structural drawings.

B. The wood truss roof system is a delegated design and the truss manufacturer shall engage a qualified professional civil engineer, licensed in the state of Louisiana with the following responsibilities:
   1. Provide a truss placement plan that clearly shows the dimensioned location of all trusses, clearly labeled.
   2. Provide truss-to-truss connections clearly labeled with calculated load, the specific connector model to be used, and the number and type of nails or screws that must be used with each connector.
   3. Indicate details for the anchorage of the trusses to the supporting structure as indicated in the Drawings.
   4. Indicate locations of field blocking to maintain proper load path.
   5. Provide all other elements and details necessary to certify that the erected trusses will act as an entire roof system capable of transferring roof loads through the system to the elements providing resistance.
   6. Certify that the loads provided to each truss to the truss designer by the truss manufacturer are in conformance with the loading requirements.
   7. Provide a bracing plan that is coordinated with every individual truss design drawing.

1.4 SUBMITTALS

A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

B. Shop Drawings: Prepared by or under the supervision of a qualified professional civil engineer, licensed in the state of Louisiana. Show fabrication and installation details for trusses. All shop drawings (including all plans, details, and calculations) shall be stamped and signed by the supervising engineer.
   1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
   2. Indicate sizes, stress grades, and species of lumber.
   3. Provide drawings that indicate sizes and locations of temporary and permanent bracing members required to prevent buckling of individual truss members due to design loads.
   4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
   5. Show splice details and bearing details.
   6. Indicate bearing elevations for each end of all trusses.
   7. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   8. Show locations, types, model numbers, and provide literature for the hurricane ties chosen to resist lateral and uplift forces, as determined by design.
   9. Clearly indicate all special loading on truss placement plan and on truss calculations.
   10. Provide truss permanent bracing plans and details which have been properly coordinated with bracing assumptions indicated on the individual truss design drawings. All truss permanent bracing plans and details shall be stamped and signed by a qualified professional civil engineer, licensed in the state of Louisiana.
       a. Show all necessary permanent bracing of truss webs and truss bottom chords.
       b. Show locations of continuous lateral bracing and provide details and locations of diagonal bracing.
       c. Provide details of brace connections.
       d. Indicate which bracing is to be accommodated with “T” or “L” with appropriate details.
       e. Locations and detailing of bracing shall be such that it does not conflict with other specified items or systems.

C. Qualification Data: For metal-plate manufacturer professional engineer fabricator and Installer.

D. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

E. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
   1. Metal-plate connectors.
   2. Metal truss accessories.

1.5 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
   1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
   2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer licensed to practice structural engineering in the State of Louisiana.

B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

C. Source Limitations for Connector Plates: Obtain metal connector plates from a single manufacturer.

D. Comply with applicable requirements and recommendations of the following publications:
   1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
   2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
   3. SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

E. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations of SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
   1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
   2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
   3. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.7 COORDINATION

A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

2.1 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. Provide dressed lumber, S4S.
   3. Provide dry lumber with 15 percent maximum moisture content at time of dressing.

B. Minimum Specific Gravity For Truss Lumber: 0.55.

C. Minimum Chord Size For Roof Trusses: 2 by 6 inches nominal for both top and bottom chords (not required for trusses which span less than 15 feet between supports).

D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 6 Section Rough Carpentry.

2.2 METAL CONNECTOR PLATES

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. Alpine Engineered Products, Inc.
   2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
   3. CompuTrus, Inc.
   4. Eagle Metal Products.
   5. Jager Building Systems, Inc.
   6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
   7. Robbins Engineering, Inc.
   8. TEE-LOK Corporation; a subsidiary of Berkshire Hathaway Inc.
   9. Truswal Systems Corporation.

B. General: Fabricate connector plates to comply with TPI 1.

C. Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.
   1. Use for interior locations where stainless steel is not indicated.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
   1. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
   1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
   2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.4 METAL TRUSS ACCESSORIES

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. Cleveland Steel Specialty Co.
   2. Harlen Metal Products, Inc.
   3. KC Metals Products, Inc.
   4. Simpson Strong-Tie Co., Inc.
   5. Southeastern Metals Manufacturing Co., Inc.
   6. USP Structural Connectors.

B. Allowable Design Loads: Provide products with allowable design loads, as published by the manufacturer, which meets or exceeds those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

D. Truss Tie-Downs: **Truss supplier shall design furnish and install hurricane ties for connections of each roof truss to its supporting members to resist horizontal and uplift forces as determined by design of each roof truss. Submit model, gage and literature to architect with truss shop drawings for approval.**

E. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches wide by 1 inch deep by 0.040 inch thick, made to fit between 2 adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.

2.6 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to size, configuration, thickness and anchorage details required for types of joint designs indicated. Increase size and gage of connector plates by 33% over the minimum size required by design.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
   1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

E. At all shear trusses, blocking trusses, drag trusses, or other trusses indicated to transfer lateral load, diagonal members shall be provided throughout entire length of truss in every truss panel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install temporary and cross bracing to hold trusses in place according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in truss accessories according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.
   1. Anchor trusses to girder trusses as required by design.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
   1. Install bracing to comply with Division 6 Section Rough Carpentry.

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not cut or remove truss members.

L. Replace wood trusses that are damaged or do not meet requirements.
   1. Do not alter trusses in field.

M. Trusses shall be set to 2'-0" maximum spacing, unless noted otherwise. Brace temporarily and permanently to sustain a vertical position under construction and design loads. Block eaves and ridges to provide straight alignment of trusses.

N. Provide sub-fascias to align ends of trusses and deck.

O. The contractor is responsible for proper wood truss handling, alignment of trusses, and proper temporary bracing. **All permanent bracing and connections required by the truss design is also the responsibility of the contractor, as well as sufficient bracing to hold every truss member in the position assumed for its design**. The proper temporary bracing required by the contractor shall equal or exceed those recommendations as set forth by the TRUSS PLATE INSTITUTE, INC. "BRACING WOOD TRUSSES: COMMENTARY & RECOMMENDATIONS BW-76."

P. Truss supplier shall design and provide all framing required for stability at overhanging corners of the roof. Provide additional members along roof edge as required.

Q. For truss support of mechanical/electrical/plumbing pipes 3" in diameter or greater, provide pipe support at every truss along the pipe run. Attachment shall be made within 3" of a panel point location.

R. For truss support of mechanical/electrical/plumbing pipes 3" in diameter or greater, provide strut channel type trapeze hanger assembly which engages a minimum of three trusses at each support location. Provide supports for pipes at 48" on center maximum spacing within 3" of panel point locations.

3.2 REPAIRS AND PROTECTION

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

C. Protective Coating: Clean and prepare exposed surfaces of metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.
   1. Apply materials to provide minimum dry film thickness recommended by coating system manufacturer.

END OF SECTION

SECTION 06410
LAMINATED FINISH CUSTOM CASEWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

A. **(ALL MILLWORK UNLESS NOTED OTHERWISE.)**
Furnish, deliver, and install all casework as shown on drawings and as specified herein:
Plastic Laminate finished fiberboard constructed casework.

B. Furnish and install all hardware, fillers, scribes, finished ends, finished backs, counter tops, back splashes, and cutouts required to provide a complete and finished project.

C. Provide locks where shown on casework drawings or described in equipment lists. *All sink bases shall have locks.*

D. Inspect and properly adjust all casework and its related hardware. Repair damages, remove and dispose of all packing material, debris, and dirt resulting from casework installation leaving area broom clean.

E. *For plastic laminate finished cabinets, Contractor shall note that millwork shall meet or exceed* ***Custom standards for AWI****. Wood grain laminate shall be applied in direction of fine wood furniture.* Vinyl edging must match face laminate or edge laminate shall be installed prior to face laminate.

F. If not noted otherwise, Contractor is to *assume wood grain laminate which shall be applied in vertical direction of fine wood furniture.*

1.02 WORK IN OTHER SECTIONS

A. All sinks and fittings, couplings and connectors, piping, traps, supplies, shutoffs, and special plumbing fixtures to meet local codes; all electrical fixtures and devices, conduit, wiring, and connectors; and all fans, blowers, motors, ductwork, and metal grilles not specified as part of casework contract including Installation, connection, and testing of all sinks, fittings, electrical fixtures, providing all rough-ins, mechanical piping, electrical runs, and connections required for a complete project. This supplier shall be responsible for coordinating these items to fit into casework where required.

B. Blocking, framing, and reinforcement in walls, ceilings, and floors for anchoring of cabinets and trim.

C. General millwork and wood trim items.

D. Locks master keyed to room doors and other special locks other than cabinet locks specified herein.

E. Vinyl base molding when not specified as part of casework contract.

F. *Where Solid Surface or Engineered Stone are specified under 06650, this supplier is to coordinate work with that section.*

1.03 QUALIFICATIONS

A. The casework shall conform to configuration, arrangement, design, material quality, joinery, panel thickness, and surfacing of that specified and shown on drawings.

B. Manufacturers requesting approval shall submit samples with cutaways showing cabinet construction if requested, joinery, drawer and door construction, hardware, and materials; along with catalogs and specification in order that accurate evaluations can be made. Samples may be impounded for the duration of contract to insure construction specification compliance.

C. Work in this section shall comply with the specified grade(s) of work and section (s) of the current edition of the Architectural Woodwork Institute Quality Standards.

1. Work in this section shall be performed by a firm certified by the Architectural Woodwork Institute (AWI) Quality Certification Program and shall be certified as meeting the referenced standard under the full terms and conditions of the AWI Quality Certification Program.

1.04 SUBMITTALS

A. Shop drawings shall be submitted for approval according to Sectio 01600. Drawings shall consist of all elevations, sections and plans as necessary to indicate arrangement and relation to adjacent work and equipment. Centerline of service requirements shall be noted for use by other trades.

B. Color samples shall be submitted for selection and coordination at time of contract award. Samples of actual material and colors shall be available as required.

1.05 COLOR SELECTION

A. A minimum of thirty colors and patterns shall be available as standard selections for cabinet exteriors, door and drawer colors. See 06001 for manufacturers.

B. All exposed exterior cabinet body edges and door and drawer edges shall be color matched with cabinet sides, doors, and drawer fronts.

PART 2 - PRODUCTS

2.01 CABINET MATERIALS

A. Cabinets shall be constructed 45pcf minimum density (medium) fiberboard except that all countertops and shelves at sink bases shall be 3/4" plywood with exterior rated glue. PARTICLE BOARD IS NOT ACCEPTABLE. See component description for thickness.

B. Doors shall be laminated *both sides* with 1/32 inch high pressure plastic laminate.

C. All exposed exterior surfaces should be laminate with 1/32 inch plastic laminate.

D. All exposed edges of cabinets, doors and drawer edges shall be ***3mm minimum vinyl*** *in colors as selected by Architect.*

E. All countertop (counter) edges shall be **3mm "T-Molding"** equal to **#4542 by Charter Industries**

with a minimum of **9 stock colors**. Colors to be selected by Architect.

F. All framing members should be laminate on both sides and exposed edges.

G. All exposed interior surfaces should be laminated with .025 inch, high pressure plastic laminate cabinet liner including shelves and dividers or shall be constructed of thermally fused Melamine surfaced material meeting NEMA LD3-1991-GP28 and American Laminators Assoc. Standards 1988.

H. Drawers: Drawer fronts should have 1/32 inch plastic laminate on exposed face of fiberboard board core with .025 inch plastic laminate liner on interior surface. Drawer front edges should be edged with vinyl to match face laminate. Drawer body should be laminated on both sides with .025 inch plastic laminate liner (see G) with top edges receiving edge trim. Drawer bottoms should be laminated with .025 inch plastic laminate liner (see G).

I. Plastic Laminate will be selected from Nevamar, Wilson Art, Formica at designers discretion.

2.02 HARDWARE

A. Hinges: shall be Blum Module 170 degree concealed, European style, 170 degree opening (90 degree opening where adjacent to wall), self-closing. Products by Hafele are approved for bidding.

B. Pulls shall be cast brass, accurately positioned on door and drawer front with machine screws. Pulls shall be Stanley #4484. Finish shall be brushed aluminum. Equal pulls by Hafele are approved for bidding.

C. Drawers and glide out shelves shall be suspended on nylon roller steel slides to insure quiet, smooth operation. Slides shall have 100 pound load rating (minimum) with built in drawer stop and self close feature in the last one inch of travel. Glides shall be full extension K & V 8400 typical or Hafele Accuride.

D. File drawers shall be suspended on full extension steel slides with ball bearings and a 100 pound minimum load rating, equal to K&V 8400 or Hafele Accuride. In addition file drawers shall be provided with hanging frames. Hanging file rail shall be mounted on drawer sides manufactured by CPF. An equivalent framing system by KineFlex is acceptable. **Submit shop Drawing for approval indicating details, manufacturer, etc.**

E. Locks will be provided where shown on drawings or cabinet description:
Locks shall be cylinder type, die cast, with five disc tumbler mechanism. Each lock shall be provided with 3 milled brass keys. Provide option of selecting keyed alike, keyed different, and master keyed locks; Knape Vogt 986, Corbin 02067, Yale 9730 - see plan notes for more specifics.

F. Adjustable shelf standards and supports shall be Stanley 798/799, Knape & Vogt 255 or Grant 120/121. *Line Boring with metal support clips is acceptable.*

H. Grommets may be solid plastic or metal with cord slot cover (equal to Mockeet) with at least 8 colors to choose from.

I. K&V or Hafele Glass Window Tracks where noted. Refer also to Section 11132 for Television and Monitor Equipment. *This contractor shall coordinate installation of these devices into the millwork. Confirm supplier with general contractor.*

J. Counter supports shall be equal to Rakks EH Series for Flush Mounted Installation as manufactured by Rangine Corporation, Needham, Massachusetts 02494, Phone (781) 455-8700. *Furnish all accessories for complete installation. Escutcheons Plates required . Install per manufacturers printed instructions & recommendations.*

2.03 WORK SURFACES & DECORATIVE SURFACES

A. Plastic laminate counter tops shall be surfaced with general purpose .050 thick plastic laminate meeting NEM spec. LD3-1975 GP-50. Counter top cores shall be 3/4" exterior grade AB plywood. All exposed edges which are not **solid surface or engineered stone** shall be covered with same color as top surface.

B. Back splashes and end splashes are to be provided as indicated on drawings and shall be surfaced with same laminate as top with coved transition unless noted otherwise. *Unless noted otherwise back splashes shall be full height to bottom of cabinet.* Where 4" or 6" back splash are shown core shall be 3/4" exterior plywood. All counters with sinks shall have back splashes. Provide backer for cove from top to splash.

C. **Refer to Section 06611- Solid Polymer Fabrications (Solid Surfaces) only** where noted on drawings or schedules. Coordinate installation. **SEE FINISH PLAN & INTERIOR FINISH SCHEDULE**

2.04 COMPONENT DETAILS

A. Corner joints incorporated in cabinets shall be equal to dowel pin construction and must be factory glued and clamped under pressure to assure rigid load bearing corner joints.

B. Cabinet ends shall be 3/4 inch thick panels of balanced construction, precision bored for dowel pins installed in horizontal cabinet members. Base and tall units shall have one piece end panels continuous to floor for added load capabilities. Unexposed ends shall have laminate backing sheet.

C. Cabinet bottoms and tops shall be 3/4 inch thick panels of balanced construction for base and tall units.

D. Kick panels shall be four inch high, set back from the cabinets front edge and mechanically fastened to the cabinet bottom and ends, becoming an integral part of the cabinet structure.

E. Back panels shall be set 3/8 inch thick set in cabinet side grooves with melamine finish. Wall cabinet backs shall also set in top and bottom shelf grooves.

F. Finished exposed backs of fixed cabinets are to be 3/4 inch thick panels of balanced construction surfaces.

G. Frame rails between drawers must be full length, 3/4 inch thick x 3-1/2 inch wide, dowel pinned, and fastened into cabinet sides.

H. Hang rails shall be provided in wall cabinets in the upper back corner for mounting units to wall.

I. Drawers shall be full box design with a separate front. Drawer sides and end must be constructed of 5/8 inch high density fiberboard. Bottoms shall be 1/4 inch thickness. Corner joints shall be interlocking dowel pin design. Hardwood dowel pins eight mm diameter shall be inserted into drawer ends and fitted into matching hole patterns in drawer sides. Bottoms must be trapped in grooves all four sides. All joints shall be glued and bottoms shall have additional mechanical fasteners.

Drawers shall be suspended on slides. Seal drawer joints to match finish & make them leakproof.

J. Solid hinged doors shall be 3/4 inch thick material of balanced construction. Doors 48 inches and less in height shall have two hinges per door. Doors above 48 inches in height, but not exceeding 63 inches in height, shall have three hinges per door, and all doors in excess of 63 inches in height shall have four hinges per door. Doors over 48" shall be 1" thick. Adjacent doors shall match in thickness.

K. Adjustable shelves less than 36 inches in length shall be 3/4 inches thick. Shelves 36 inches long and over, and all adjustable shelves in wall cabinets and bookcases, shall be one inch thick. All adjustable shelves shall be constructed of 50 pound density fiber board.

L. NOTE: Frameless construction is acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Verify adequacy of backing and support framing before proceeding.

B. Set and secure casework in place rigid, plumb, and level. Permanently fix cabinet and counter bases to floor using appropriate angles and anchorages.

C. Use purpose designed fixture attachments at concealed locations for wall mounted components.

D. Carefully scribe casework which is against other building materials, leaving gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinet and counter bases to walls using appropriate angles and anchorages.

F. Counter sink anchorage devices at exposed locations used to wall mount components, and conceal with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

G. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units, counter tops and overhead cabinets.

3.03 ADJUSTING AND CLEANING

A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

B. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION

SECTION 06650
SOLID POLYMER FABRICATIONS

PART I. GENERAL

1.01 Description

A. Work described in this section: Counter Tops

1.02 REFERENCES

A. Applicable Standards: Standards of the following, as referenced herein:
1. American National Standards Institute (ANSI)
2. American Society for Testing and Materials (ASTM)
3. National Electrical Manufacturers Association (NEMA)
4. Federal Specifications (FS)

1.03 SUBMITTALS

A. Shop drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.

B. Samples: Submit minimum 2" x 2" (50 mm x 50 mm) samples. Indicate full range of color and pattern variation. Approved samples will be retained as standards for work.

C. Product description, fabrication information and compliance with specified performance requirements.

D. Care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.

1.04 QUALITY ASSURANCE

A. Allowable tolerances:
1. Variation in component size: ± 1/8" (3 mm).
2. Location of openings: ± 1/8" (3 mm) from indicated location.

B. Solid Surfacing must be applied by a certified installer. Provide installers certification prior to start of work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Do not deliver components to o project site until areas are ready for installation. Store components indoors prior to installation.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.06 WARRANTY

A. Provide manufacturer’s 10 year warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

1.07 CARE & MAINTENANCE

A. Provide care and maintenance information for the owner.

II. PRODUCTS

2.01 SOLID POLYMER FABRICATIONS

A. Specified product: CORIAN® SURFACES, to be selected from F Series Colors, Matt Finish from The DuPont Company or approved equal.

B. Material: Homogeneous filled acrylic; not coated, laminated or of composite construction; meeting ANSI Z124.3 & .6, Type Six, and Fed. Spec. WW-P-541E/GEN.
1. Material shall have minimum physical and performance properties specified in the following Section U.
2. Superficial damage to a depth of 0.010" (,25 mm) shall be repairable by sanding and polishing.

C. Countertops: 1/2" (13 mm) over 3/4" plywood or 3/4" (19 mm) thick, adhesively joined with inconspicuous seams; edge details as specified on the Architect's Drawings; color as listed on color schedule or to be selected from full range of colors available. Surfaces to be unaffected by Class I reagents and repairable after exposure to Class II reagents.

D. Where applicable: At areas exposed to cold, use Technical Bulletins: CTDC 119, 124, 125.
1. Make cutouts to templates furnished by the cold appliance manufacturer.
2. Reinforce joints and cutouts as recommended by the surfacing manufacturer.
3. Provide insulation between solid surfacing and adjacent cold pans.
4. Thermally isolate hot applications from cold.

E. Where applicable: At areas where exposed to hot, use Technical Bulletins:, CTDC-119, 124, 125.
1. Provide expansion joints in countertop as detailed on the Architect's Drawings.
2. Make cutouts to templates furnished by the hot appliance manufacturer.
3. Reinforce joints and cutouts as recommended by the surfacing manufacturer.
4. Provide insulation between solid surfaceing and adjacent hot water pans and food warmers.
5. Thermally isolate hot applications from cold.

F. Performance characteristics:

PROPERTY	REQUIREMENT	TEST PROCEDURE
Tensile Strength	6000 psi	ASTM D 638
Tensile Modulus	1.5×10^6 psi	ASTM D 638
Flexural Strength	7890 psi	ASTM D 790
Flexural Modulus	1.4×10^6 psi	ASTM D 790
Elongation	0.4%	ASTM D 638
Strain at Break	0.81%	ASTM D 638
Work to Break	2.48 in. lbs.	ASTM D 638
Hardness	94 Rockwell "M" Scale 56 Barcol Impressor	ASTM D 785

Thermal Expansion	3.02 x 10^{-6} in/in/°C	ASTM D 696
	1.80 x 10^{-6} in/in/°F	
Thermal Conductivity	7.0 Btu/hr/sq ft °F	DuPont Test
Specific Heat	0.2935 + (0.001 % °C) pcu/lb °C	DuPont Test
Volumetric Heat Capacity	0.33 Btu/lb °F	DuPont Test
Gloss (60 Gardner)	5-80 (matte-polished)	NEMA LD 3-3.15
Color Stability	No Change - 200 hrs	NEMA LD 3-3.10
Wear and Cleanability	Passes	ANSI Z 124.3
Abrasion Resistance	No loss of pattern Wt loss (1,000 cycles) - 0.2 gm Wear (10,000 cycles) - .008"	NEMA LD 3-3.10
Boiling Water Surface Resistance	No Change	NEMA LD 3-3.05
High Temperature Resistance	No Change	NEMA LD 3-3.06
Conductive Heat Resistance	No Change	NEMA LD 3-3.08
Impact Resistance Notched Izod Gardner	 .28 ft. lbs/in. of notch solid colors 9.3 ft. lbs particulate colors 13.3 ft. lbs	 ASTM D 256 (Method A) ASTM D 3029
Ball Drop 1/4" (6 mm) sheet 1/2" (13 mm) sheet 3/4" (19 mm) sheet	 >36" w 1/2 lb ball, no failure >144" w 1/2 lb ball, no failure >204" w 1/2 lb ball, no failure	NEMA LD 3-3.03
Bowls (Point Impact)	No cracks or chips	ANSI Z124.3 and 124.6
Stain Resistance	Passes	ANSI Z124.3
	Rating - 41 (modified*)	ANSI Z124.3(modified)
Weatherability	No Change - 1000 hours	ASTM D 1499
Fungi and Bacteria	No Attack	ASTM G 21, G 22
Specific Gravity solid colors particulate colors	 1.8 1.69	

Material Weight	1/4" (6 mm),	1/2" (13 mm),	3/4" (19 mm)	
solid colors	2.35	4.7	7.0 lbs/sq. ft	
particulate colors	2.1	4.2	6.2 lbs/sq. ft.	
Water Absorption	After 24 hrs	Long Term	ASTM D 570	
3/4" (12 mm) sheet	0.04%	0.94%		
1/4" (6 mm) sheet	0.09%	0.8%		
Flammability	1/4"(6 mm)	1/2"(13mm)	3/4" (19mm)	
solid colors				ASTM E84
Flame Spread	25(15)	5	5	
Smoke Developed	25(20)	10	15	
Class Rating	1	1	1	
particulate colors				
Flame Spread	20	15	15	
Smoke Developed	5	25	30	
Class Rating	1	1	1	

Oxygen Index	0.357	ASTM D 2863
Pittsburgh Protocol Toxicity (as used by NY State)	solid colors 99 grams particulate colors 67 grams	"LC 50" Test
Coefficient of Friction	0.189 static 0.171 dynamic	DuPont Test TD-511-A
Arc Resistance	190 seconds, no track 60 seconds, rerun, no track	ASTM D 495

Dielectric Strength solid colors particulate colors	 275 volts/0.001" 263 volts/0.001"	ASTM D 149
Dielectric Constant solid colors particulate colors	 4.96 at 100 Hz 4.46 at 100 Hz	ASTM D 150
Dissipation Factor solid colors particulate colors	 0.0698 at 100 Hz 0.077 at 100 Hz	ASTM D150
Surface Conductivity solid colors	 5.0×10^{16} Mho	DuPont Test TD-533-A

Volume Conductivity solid colors	 4.7×10^{16}Mho	DuPont Test TD-533-A
Volume Resistivity solid colors particulate colors	 4.2 Ohms cm x 10^{-14} 10.0 Ohms cm x 10^{-14}	ASTM D 257
Electrical Charge Relaxation Time solid colors	 560 seconds	PTMS 101B, MIL B-81705
Heat of Combustion	2.20 cal/gm	Oxygen bomb (calorimeter method)

2.02 ACCESSORY PRODUCTS

A. Joint adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints, with a chemical bond. (Technical Bulletin: CTDC 102)

B. Panel Adhesive: Manufacturer's standard neoprene-based panel adhesive meeting ANSI A 136.1-1967 UL® listed. (Technical Bulletin: CTDC 102)

C. Sealant: Manufacturer's standard mildew-resistant, FDA/UL® recognized silicone sealant in color matching or clear formulations. (Technical Bulletin: 102, 127)

2.03 FABRICATION

A. Fabrications to be performed by a Manufacturer’s Certified fabricator/installer.

B. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer’s requirements. (Technical Bulletin: CTDC-117)

C. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 2" (50 mm) wide reinforcing strip of material under each joint. [Technical Bulletins: CTDC-124, 129, 134]

D. Provide holes and cutouts for plumbing and bath accessories as indicated on the drawings.

E. Route and finish component edges to a smooth, uniform finish. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

F. Finish to be selected by Architect: All surfaces shall have uniform finish. [Technical Bulletins:CTDC100, 123, 132] Matte ,with a gloss rating of 5 - 20.

G. Thermoforming: Comply with forming data from manufacturer. (Technical Bulletin CTDC-110]
   1. Construct matching molds of plywood to form component shape.
   2. Form pieces to shape prior to seaming and joining.
   3. Cut pieces larger than finished dimensions. Sand edges. Remove all nicks and scratches.
   4. Heat entire component uniformly between 275-325°F during forming.
   5. Prevent blistering, whitening and cracking of solid surfacing material during forming.

H. Cove back splashes: Fabricate 1/2" (13 mm) radius cove at intersection of counters and back splashes.Form back splashes using [1/2" (13 mm)][3/4" (19 mm)] matching solid surface material. Fabricate in shop or field. [Technical Bulletin: CTDC-112]

III. EXECUTION

3.02 INSTALLATION

A. Install components plumb and level, in accordance with approved shop drawings and product installation details.

B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.

C. Adhere undermount/submount/bevel mount sinks/bowls to counter tops using manufacturer's recommended adhesive and mounting hardware. [Technical Bulletin H-16307]

D. Provide back splashes and end splashes as indicated on the drawings. Adhere to counter tops using manufacturer's standard color-matched silicone sealant.

E. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Components shall be clean on Date of Substantial Completion.

F. Make plumbing connections to sinks in accordance with Division 15. Mechanical.

G. Protect surfaces from damage until Date of Substantial Completion. Repair or replace damaged work that cannot be repaired to architect's satisfaction.

H. Fabricator/Installer is to provide Care and Maintenance information, review maintenance procedures and warranty with the Owner’s representative upon completion of project.

End of Section

SECTION 07155
DAMPPROOFING

PART 1 - GENERAL

1.01 EXTENT

A. Apply dampproofing material to exterior face of wall sheathing.

B. Dampproofing coating shall be continuous and unbroken and form in all cases a positive barrier between the inside of the building and all exterior surfaces. Joints in sheathing shall be provided with compatible fiberglass mesh tape before coating. Joint may require a second coat for unbroken membrane.

1.02 QUALITY CONTROL

A. Subcontract mastic dampproofing to applicator specializing or having experience in type of dampproofing specified, who is approved by manufacturer of materials specified, and has completed similar installations in the general area of the Project.

1.03 PROTECTION

A. Handle dampproofing items to avoid damage to materials or to work in place. Satisfactorily repair or remove and replace work that has been damaged.

B. Protect all adjacent surfaces which are not to receive dampproofing materials from stain, soiling and damage.

1.04 DELIVERY AND STORAGE

A. Deliver packaged materials to site in manufacturer's original, unopened, labeled containers.

B. Arrange deliveries to provide sufficient quantities to permit continuity of any phase of work.

C. Store and handle dampproofing items to prevent damage to materials or work in place.

1.05 WARRANTY

A. Warranty this work for a period of two years. Make repairs to the dampproofing if any leakage occurs due to faulty workmanship or materials.

B. Deliver dampproofing warranty to Owner upon completion of Work.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Conform to Federal Specification ASTM D-1227 (Non-Asbestos) The following manufacturers are approved with documentation that they are compatible with sheathing and are non-asbestos:
   1. BASF : Hydrocide: 700B
   2. Karnak 920
   3. Substitutions: Instruction to Bidders and Section 01600 - Materials and Equipment.

PART 3 -EXECUTION

3.01 EXAMINATION

A. Examine surfaces that are to receive dampproofing. Report unsatisfactory conditions.

B. Do not start dampproofing work until unsatisfactory conditions have been corrected.

C. Proceeding with installation of dampproofing will be construed as evidence of acceptance of conditions under which moisture-proofing work will be done.

3.02 PREPARATION

A. Remove loose materials, moisture, grease, and projections. Surfaces shall be completely dry before applying dampproofing materials.

B. Fill around pipes, anchors, and other items that could penetrate dampproofing.

C. Repair defective work and damaged surfaces before beginning dampproofing work.

D. Do not start application of dampproofing until receiving surfaces have been approved.

3.03 APPLICATION

A. Apply two coats. Install under strict accordance of manufacurer's recommendations.

B. Apply dampproofing coating to extent shown on Drawings and specified and in strict accordance with manufacturer's recommendations.

3.04 CUTTING AND REPAIRING

A. Do not cut or puncture installed dampproofing without specific prior approval.

B. Cutting, when approved, shall be done by trade that installed original dampproofing.

C. Remove damaged or defective dampproofing to expose original surface. Reapply as specified for the original work.

D. Remove and reapply damaged or defective dampproofing as necessary to provide a completely watertight condition.

END OF SECTION

SECTION 07175
WATER REPELLENT COATING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish and install water repellent coating **to all new exterior masonry.**

1.02 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacture of water repellent coatings.

B. Applicator: Acceptable to manufacturer.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 01300.
B. Include details of product description, tests performed, limitations to coating , cautionary procedures required during application, and chemical properties, including percentage of solids.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

D. Submit manufacturer's certificate under provisions of Section 01400 that coating meets or exceeds specified requirements.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Do not apply coating when ambient surface temperature is lower than 40 degrees F or higher than 200 degree F and per manufacturers recommendations.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Protectosil CHEM-TRETE 40 VOC, Evonik Industries

B. Hydrozo Clear 40 VOC by Degussa Building Systems.

C. Substitutions: Refer to Article 4.3 - Instructions to Bidders and Section 01600 - Materials and Equipment

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify joint sealants are installed and cured.

B. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.

C. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Remove loose particles and foreign matter.

B. Remove oil or foreign substance with a chemical solvent which will not affect coating.

C. Scrub and rinse surfaces with water and let dry.

D. Protect adjacent surfaces not scheduled to receive coating.

E. If applied on unscheduled surfaces, remove immediately, by approved method.

F. Protect Landscaping, property, and vehicles.

3.03 APPLICATION

A. Delay work until masonry mortar, concrete substrate is cured a minimum of 60 days.

B. Apply coating in accordance with manufacturer's instructions.

END OF SECTION

SECTION 07210
BUILDING INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Batt insulation in exterior stud walls.

B. Batt insulation at bottom chord of wood roof trusses and truss joists *(note that this will be supported by gypsum attached to bottom of trusses)* **(Only as Option to Spray Foamed Insulation)**

C. Sound batts in all interior walls.

D. Rigid insulation noted under siding. **Only as noted on Drawings.**

1.02 REFERENCES

A. FS HH-I-521 - Insulation Blankets.
B. FS HH-I-1252 - Insulation thermal, reflective (aluminum foil).

1.03 SUBMITTALS

A. Submit manufacturer's installation instructions under provisions of Section 01300.

PART 2 - PRODUCTS

2.01 SOUND ATTENUATION BATTS

A. Sound Attenuation Batts shall be manufactured by one of the following.
1. USG - Thermafiber Creased.
2. Substitutions: Under provisions of Section 01600 and Instructions to Bidders.

B. Sound Attenuation Blankets shall be 3" Thermafiber SAFB furnished in blankets 1" wider than space to allow for center partial field cut and creasing into cavity.

C. Sound Blankets shall meet UL test requirements as part of fire rated assemblies where required.

D. Sound Test TL-85-128 or equal shall confirm 51 STC rating.

2.02 BATT INSULATION

A. Batt Insulation shall be manufactured by one of the following.
1. Owens/Corning Fiberglas, FS-25, Manville - FSK - 25 and equal products by Knauf.
2. Substitutions: Under provisions of Section 01600 and Instructions to Bidders.

B. Foil backed fiberglass blankets: The manufacturer's certified "R: factor designation shall be shown on the product packages or on the product. *Flame Spread shall be 25 or less.*
1. Thickness: *six inches in exterior stud walls and 10" at bottom of trusses and at truss-joists.*
2. "R" Value: 19 for 6" insulation; 30 for 10" thickness
3. Taps shall be overlapped and stapled.

C. Testing Information
   1. Flame Spread Classification: 25
   2. Smoke Developed Classification: 50 or less
   3. Fuel Contributed Classification: 25 or less
   4. Testing; ASTM E-84-68, UL 723, NFPA 255.

2.03 Fiberglass Board Insulation *(semi-rigid for installation on walls of mechanical rooms*.)
   1. FSK foil face
   2. Density of 6 pcf
   3. .03 perm rating, K value of .23

2.04 Rigid Insulation Board *(under siding at exterior of building)* shall be glass figer formed into boards bonded by thermosetting resin with factory applied foil scrim facing manufactured by Knauf, Owen Corning or equal with flame spread not exceeding 25. Provide compatible foil tape to seal joints.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify adjacent materials are dry and ready to receive installation.

B. Verify mechanical and electrical services within walls have been installed and tested.

3.02 INSTALLATION OF BATT INSULATION

A. Install batt insulation in accordance with manufacturer's instructions.

C. Trim insulation neatly to fit spaces. Use batts free of damage.

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

E. Install insulation with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane to provide complete system.

END OF SECTION

SECTION 07411
METAL ROOF PANELS
(Standing Seam Metal Roof)

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. Section Includes:

1. Standing-seam metal roof panels.

1.03 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weather tight roofing systems.

1.04 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3L/s per sq.m) of roof area when tested according to ASTM E 1680 at the following test-pressure difference:

1. Test-Pressure Difference: Negative 1.57 lbf/sq ft (75 Pa).

2. Test-Pressure Difference: Positive and negative .57 lbf/sq ft (75 Pa).

3. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq ft (720 Pa) and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.

4. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

D. Water Penetration: Not water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86lbf/sq ft (137 Pa).

2. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. (300 Pa) and not more than 12.0lbf/sq ft (575 Pa).

3. Postive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq ft (720 Pa) and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.

4. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.

1. Uplift Rating: UL 90.

2. Standing Seam System must meet requirements of **I.B.C. Code, 2021** edition for wind uplift in **Baton Rouge, LA.**

G. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses withing limits and under conditions indicated, based on testing according to ASTM E 1592.

1. Wind Loads: Determine loads based on the following minimum design wind pressures:

a. Uniform pressure of 30 lbf/sq ft (1436 Pa), acting inward or outward.

2. Deflection Limits: Metal roof panel assemblies shall withstand wind loads with vertical deflections no greater than 1/240 of the span.

H. Thermal Movements: Allow for the thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

I. Thermal Performance: Provide insulated metal roof panel assemblies with thermal-resistance value ®-value) indicated when tested according to ASTM C 518.

J. Solar Reflectance: Initial solar reflectance of not less than 0.25 when tested according to ASTM E 903, and maintained, under normal conditions, solar reflectance not less than 0.15 for 3 years after installation.

1.05 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 type of roof panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trip flashings, closures and accessories; and special details. **Distinguish between factory-and field-assembled work.**

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):
a. Flashing and trim.

C. Samples for Initial Selection: For each type of metal roof panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Roof Panels: 12 inches (300mm) long by actual panel width. Include fasteners, clips, closures, and other metal roof panel accessories.

2. Trim and Closures: 12 inches (300mm) long: Include fasteners and other exposed accessories.

3. Accessories: 12-inch- (300mm-) long Samples for each type accessory.

E. Delegated Design Submittal: For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Snow Retention System Calculations: Include calculation of number and location of snow guards based on snow load, roof slope, panel length and finish, and seam type and spacing.

F. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installers of the items involved:

1. Roof panels and attachments.

2. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, and items mounted on roof curbs.

G. Qualification Data: For qualified professional engineer.

H. Materials Certificates: For thermal insulation from manufacturer.

I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

J. Field quality-control reports.

K. Maintenance Data: For metal roof panels to include in maintenance manuals.

L. Warranties: Samples of special warranties **specific to this project. All Warranties shall be Louisiana State Approved. No materials shall be ordered prior to warranties being approved by Architect during the submittal process.**

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal roof panels from single source from single manufacturer.

D. Surface-Burning Characteristics: Provide metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.

2. Smoke-Developed Index: 450 or less.

E. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2. Combustion Characteristics: ASTM E 136.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof eave, including fascia, and soffit as shown on Drawings; approximately four panels wide by full eave width, including insulation, underlayment, attachments, and accessories.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's Insurer if applicable, testing and inspecting agency representative, metal roof panel installer, metal roof panel manufacturer's representative, deck installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories and roof-mounted equipment.

2. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.

4. Examine deck substrate conditions for compliance with requirements, including flatness and attachment to structural members.

5. Review structural loading limitations of deck during and after roofing.

6. Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.

7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.

8. Review temporary protections requirements for metal roof panel assembly during and after installation.

9. Review roof observation and repair procedures after metal roof panel installation.

10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weather tight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

E. Protect foam-plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.08 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warrantly requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.09 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports and roof penetrations with actual equipment provided.

B. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of decks, parapets, walls, and other adjoining work to provide a leak proof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from data of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.

b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A 653M, G90 (Z275) coating designation; structural quality.

2. Surface: Smooth, flat finish.

3. Exposed Coil-Coated Finish:

a. 2-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 manufacturer's written instructions.

b. Color: As selected by Architect from manufacturer's full range.

4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.02 FIELD-INSTALLED THERMAL INSULATION

A. Refer to Section 07210 -Building Insulation.

2.03 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer. Install at valleys, three feet from ridge, eave and all penetrations. Install 30 lb.felt all other areas.

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.

2. Low-Temperature Flexibility: Passes after testing at minus 20 def F (29 deg C); ASTM D 1970.

3. Products: Subject to compliance with requirements, provide one of the following:

a. Soprema Inc., Lastobond Shield HT.

b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.

c. Henry Company; Blueskin PE200 HT.

d. Metal-Fab Manufacturing, LLC; MetShield.

e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.04 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-wielded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps of factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-Mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.05 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weather tight installation.

1. Steel Panel Systems: Unless more stringent requirement are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Architectural Building Components or comparable product by one of the following:

a. Morin Corporation.
b. Atas Manufacturing.
c. Petersen Aluminum Corporation.
d. Substitutions: Under provisions of Section 01600 and Instruction to Bidders.

2. Material: Zinc-coated (galvanized) steel sheet, 0.034-inch (0.86-mm) nominal thickness.

3. Clips: Floating to accommodate thermal movement.

a. Material: 0.028-inch (0.71-mm-) nominal thickness, zinc-coated (galvanized) steel sheet.

4. Joint Type: Double folded.

5. Panel Coverage: 16 inches (305 mm.)

6. Panel Height: 2.0 inches (51 mm).

2.06 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fascia, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match

material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.

2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch (25-mm) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weather tight construction.

3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch (0.45 mm) thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fascia, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Gutters: (Only as indicated on Drawings) Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-(2400-mm) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual". Furnish gutter supports spaced a maximum of 36 inches (900 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.

D. Downspouts: (Only as indicated on Drawings)Formed from same material as roof panels. Fabricate in 10-foot (3-m) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's (Architectural Sheet Metal Manual". Finish downspouts to match gutters.

E. Ridge Vent: Pre-notched with vented zee closure. Ridge/hip trim to be hooked over zee trim and riveted to zee.

2.07 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, full length of panel.

C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weather tight and minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. End Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate

elastomeric sealant to comply with SMACNA standards.

4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

5. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

2.08 FINISHES

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

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

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements or installation tolerances, metal roof panel supports, and other conditions affecting performance of the Work.

B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.02 PREPARATION

A. Install venting composite insulation board over metal deck per manufacturer's printed recommendations and instructions. See Section 07210.

2. Comply with UL requirements for fire-rated construction.

3.03 UNDERLAYMENT INSTALLATION

A. Self-Adhering Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings and or specified herein, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

B. Install flashing to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

3.04 METAL ROOF PANEL INSTALLATION, GENERAL

A. Provide metal roof panels of full length from eave to ridge without exception. NO END CAPS.

B. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Pre-drill panels for fasteners.

1. Point of Fixity: Fasten each panel along a single line of fixing located at center of panel length.

2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.

C. Install metal roof panels as follows:

1. Commence metal roof panel installation and install minimum of 300 sq. ft. (27.8 sq.m.) In presence of factory-authorized representative.

2. Field cutting of metal panels by torch is not permitted.

3. Provide metal closures at rake walls and each side of ridge caps.

4. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.

5. Install ridge caps and vents as metal roof panel work proceeds.

6. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.

7. Install metal flashing to allow moisture to run over and off metal roof panels.

D. Fasteners:

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.

E. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

F. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

1. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.

G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

1. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.

2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.05 METAL ROOF PANEL INSTALLATION

A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at

each standing-seam joint at location, spacing and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.

2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.06 METAL VALLEY INSTALLATION

A. Form valleys of sheets not exceeding 10 feet in length. Lap joints 6 inches minimum in direction of drainage.

B. At valley, fold valley and roofing sheets and secure with cleats spaces at 18 inches oc.

C. Extend valley sheet minimum 6 inches under roofing sheets.

D. Secure flashings in place using concealed fasteners.

E. Double Cleat and seam all joints.

F. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

G. Seal metal joints watertight.

3.07 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weather tight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's Architectural Sheet Metal Manual". Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. 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 weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

C. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

D. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.08 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal roof panel units 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.

3.09 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touch-up or similar minor repair procedures.

End of Section

SECTION 07600
SHEET METAL FLASHING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. All flashings unless specified or noted otherwise shall conform to this specification including flashings furnished under other sections of this specification manual (07610 and 07605).

1.03 STANDARDS

A. Meet requirements and recommendations of applicable portions of Standards listed:
   1. American Society for Testing and Materials: ASTM
   2. Lead Industries Association: LIA
   3. Federal Specifications: FS

B. Meet the applicable requirements of the "Architectural Sheet Metal Manual" of the Sheet Metal and Air Conditioning Contractors' National Association, Inc., (SMACNA) unless exceeded by specific requirements of this Section.

1.04 SHOP DRAWINGS

A. Show locations, markings, quantities, materials sizes, fastenings, and shapes. Indicate by dimensions, locations of sheet metal items.

B. Indicate methods of connecting, anchoring, fastening, bracing and attaching work of other trades.

C. Draw profiles, sections, and views of items especially fabricated for this work at a scale large enough to permit checking for design conformity.

1.05 QUALITY ASSURANCE

A. All work under this section and section 07500 shall be furnished under one sub-contract or as noted above.

1.06 SUBMITTALS

A. Submit descriptive literature and actual samples of any manufactured item approved during bid period, such as gravel stop system, which varies from that specified and detailed.

B. Submit in accordance with Section 01300.

1.07 COORDINATION

A. Coordinate sheet metal work with roofing, insulation and related work of other trades.

1.08 WIND REQUIREMENTS

A. All metal flashings shall be installed to withstand a wind load imposed by a 90 m.p.h. wind, while remaining in place.

1.09 DELIVERY AND STORAGE

A. Arrange deliveries to provide sufficient quantities to permit continuity of installation of any phase or work.

B. Store to prevent damage to materials or structure.

1.10 WARRANTY

A. The Contractor for the sheet metal work shall warranty his work in writing free from defects in workmanship for a period of two years after completion, and shall make good all such defects discovered during this period. The warranty, addressed to the Owner, shall be delivered to the Architect.

B. Material shall be warranted in writing for twenty (20) years non-prorated covering fade, chalking and film integrity. This warranty shall include labor and materials through the 20th year.

C. Material shall not show a color change greater than 5 NBS color units per ASTM D2244-79; not show chalking in excess of 8 per ASTM D659-80.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - PRE-PAINTED SHEET METAL FLASHING

A. ColorKlad
B. Pac-Clad
C. Substitutions: See Instructions to Bidders and Section 01600 - Substitutions.

2.02 MATERIALS - PRE-PAINTED SHEET METAL FLASHING

A. All materials shall be 24 gauge hot dipped galvanized steel (G-90) commercial quality, extra smooth primed and finished one side with Kynar based fluoropolymer coating 1.0±0.1 mil total dry film thickness unless noted otherwise.

B. A wash coat of .3-.4 mil dry film thickness shall be applied to the reverse side.

C. The pre-painted finished side shall be coated with a liquid applied factory installed strippable film for protection of the finished surface during shipping, fabrication and installation.

D. The material shall be protected from heat and direct sunlight to prevent deterioration of the strippable film and possible finished coating.

E. Color shall be as selected by Architect from the standard colors.

2.03 PERFORMANCE CRITERIA - PRE-PAINTED SHEET METAL FLASHING

A. The 70 percent Kynar based finish coating shall conform to the following tests and standards: Hardness-F Minimum NCCA Technical Bulletin 11-12. Adhesion, Cross Hatch-1/16 inch (no removal): NCCA Technical Bulletin 11-5. Formability, 2T Bend (no cracking or removal): ASTM D522-60 (1973). Reverse Impact, no removal when taped: NCCA Technical Bulletin 11-6 (impact force-70 in. lbs.).

B. The base metal shall conform to the following tests and standards: Minimum yield: 36,000

PSI ASTM 370-77. Coefficient of Thermal Expansion - 6.7 x 10^6 in/in/F°; ASTM E228-71 (1979), Modulus of Elasticity - 29 x 10^6, ASTM E111-61 (1978).

2.04 SHEET METAL TYPES AND USES

A. Gravel stops and cleats, splice plates at gravel stops and equipment curbs: Pre-painted sheet metal. (See 1.01B)

B. Expansion joints and cleats, area divider flashing and all other areas not specifically addressed: Pre-painted sheet metal. (See 1.01B)

C. Gutters and Down Spouts, Preformed Facia & Eave Trim: prepainted sheet metal shall match roofing material finish - refer to 07610

D. Stack projections and plumbing vents: 4# lead.

E. Roof vents and watertight umbrellas:
Pre-painted sheet metal (see 1.01B)

F. Vertical expansion joints and through wall flashing:
Prepainted sheet metal

2.03 MISCELLANEOUS MATERIALS

A. Lead: 4# hard lead, containing not less than 3-3/4% nor more than 4-1/4% antimony, not less than 0.07% nor more than 0.10% arsenic and the remainder shall be lead, except at metal roofing where EDPM flashings will be provided.

B. Solder: Conform to ASTM B32-70, 60% tin,, and 40% lead used with acid flux of type recommended for stainless steel; except use non-corrosive rosin flux over tinned surfaces.

C. Nails: Stainless steel, size and type recommended for each application.

D. Flashing Cement: Asphalt based.

E. Primer Coating: Asphalt based.

F. Caulking: See Section 07951.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces that are to receive sheet metal. Report unsatisfactory conditions.

B. Do not start installation of sheet metal until unsatisfactory conditions have been corrected.

C. Proceeding with installation of sheet metal will be construed as evidence of acceptance of conditions under which sheet metal work will be done.

D. Except as otherwise indicated, comply with SMACNA's "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as

indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

3.02 CORROSION PROTECTION

A. Provide positive protection to prevent electrolysis between dissimilar metals used in contact with one another.

B. Protect metals from corrosion when embedded in, or in contact with other materials.

C. Coat flanges of sheet metal in contact with roofing with one coat primer coating prior to installing.

3.03 SHEET METAL

A. Install all shop and job fabricated flashings according to details and approved Shop Drawings.

B. Fabricate sections up to 10 feet long in one piece. Fold all exposed edges back.

C. Install flashing items as necessary to obtain weathertight condition.

D. Leave 1/2 inch gap at end joints and install 18 inches long cover plates set in roofing cement.

E. Solder all corner joints.

F. Form all sheet metal accurately to the dimensions and shapes required, finishing all molded and broken surfaces with true, sharp, and straight lines and angles and, where intercepting other members, coping to an accurate fit and soldering securely.

G. Unless otherwise specifically permitted by the Architect, turn all exposed edges back 1/2 inch.

H. Expansion: Form, fabricate, and install all sheet metal so as to adequately provide for expansion and contraction in the finished work.

I. Weatherproofing: Finish watertight and weathertight where so required.

J. Make all lock seam work flat and true to line, and sweated full of solder.

K. Make all lock seams and lap seams, when soldered, at least 1/2 inch wide.

L. Where lap seams are not soldered, lap according to pitch but in no case less than 3 inches.

M. Make all flat and lap seams in direction of flow.

3.04 INSTALLATION OF PRE-PAINTED SHEET METAL

A. Colorklad shall be cut, formed, or riveted using hand or power tools. Fabricate and install in accordance with drawing and specification using recognized sheet metal practices.

B. Keep cutting edges sharp, clean, properly dressed and closely aligned. Exercise care during fabrication and erection to avoid damage.

C. Use color matched touch-up paint and rivets where required.

D. Coating must be mechanically removed if soldering is necessary.

E. All fabrication and installation shall be accomplished with the strippable film in place.

F. After installation is complete immediately remove strippable film. Extended exposure of strippable film to ultraviolet light may damage paint coating underneath.

3.07 NAILING

A. Wherever possible, secure metal by means of clips or cleats without nailing through the metal.

B. In general, space all nails, rivets, and screws not more than 8 inches apart and, where exposed to the weather, use lead washers.

C. For nailing into wood, use barbed roofing nails 1-1/4 inch long by 11 ga. through flat tin discs.

3.08 SOLDERING

A. Thoroughly clean and tin all joint materials prior to soldering.

B. Perform all soldering slowly in order to heat the seams thoroughly and to completely fill them with solder.

C. Make all exposed soldering on finished surfaces neat, full flowing, and smooth.

D. Cleaning: After soldering, thoroughly wash acid flux with a soda solution.

3.09 CLEAN-UP

A. Remove soil, stain, and extraneous materials incidental to sheet metal work from adjacent surfaces. Remove and replace work that cannot be satisfactorily cleaned.

B. Remove foreign matter and clean sheet metal work to satisfactory conditions to receive specified finish.

C. For sheet metal work to receive no further finish, clean and protect exposed surfaces to present a neat, uniform and specified finish on completion of work.

D. Repair any damaged sheet metal to match adjacent sheet metal work. Remove and replace damaged or defective work that cannot be satisfactorily repaired. Repairs that appear obvious as a patch will not be acceptable.

END OF SECTION

SECTION 07605
THRU-WALL FLASHING (DAMP COURSE)

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Thru-Wall Flashing shall be provided at Door Lintels, Window Lintels and Sills, Base of Walls, Wall Lintels, and as indicated on Drawings and as required to maintain positive drainage from within walls to the exterior.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Description: Electrolytic sheet copper, bonded on both sides and edges to asphalt saturated cotton fabric with ductile asphalt mastic, full sheet crimped 3 oz or 5 oz copper coated with flexible asphalt: Cop-A-Cote by Afco Products
ACC by Phoenix Building Products
Copper Seal by York Manufacturing

B. Mastic: Asphaltic type as recommended by flashing manufacturer.
Manufacturers:
1. Plascal Corp.
2. Nevastrol

PART 3 - EXECUTION

3.01 INSTALLATION OF THRU-WALL FLASHING

A. All surfaces to be flashed shall be clean and dry.

B. Lay flashing material in a slurry of fresh mortar topped with a full bed of mortar.

C. Start flashing 1/2 inch from outside face of wall. Turn flashing up as detailed and secure in reglet where reglets are called for on Drawings. Coordinate work with masonry work.

D. Carry flashing 6 inches beyond steel lintels at heads. Turn flashing up to divert water at heads & sills.

E. When membrane flashing makes level changes and turns at corners, tightly place flashing material against surface it is protecting and secure in place with mastic. Provide weeps over flashing at 24 inches o.c.

F. Use mastic on all vertical surfaces and wherever required to hold flashing material in place.

3.02 CLEANING

A. Remove all soil and stain from adjacent surfaces caused by membrane flashing work. Dispose of excess materials and debris away from site. Remove and replace all defective flashing.

END OF SECTION

SECTION 07951
CAULKING AND SEALANTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Seal and caulk joints where shown on drawings and elsewhere as required to provide a positive barrier against passage of moisture and passage of air.

1.03 SUBMITTALS

A. Samples: Submit for selection by Architect, samples of caulking compound for each color required. Prepare sample joint where directed by Architect/Engineer before using caulking compound of color selected; work shall be done in accordance with the approved sample.

B. Manufacturer's Recommendations: Submit two copies of manufacturer's written recommendations for use and installation of each product used. Keep one copy of each on Project site when caulking and sealing is in progress.

1.04 DELIVERY AND STORAGE

A. Deliver packaged materials to site in manufacturer's original, unopened, labeled containers.

B. Arrange deliveries to provide sufficient quantities as necessary to permit continuity of any phase of work.

C. Store and handle caulking and sealing items to prevent damage to materials or work in place.

1.05 WARRANTY

A. Warranty this work in writing against defects in materials and workmanship for a period of one year from date of acceptance of Project.

1.06 WEATHER CONDITIONS

A. Do not proceed with caulking and sealing under adverse weather conditions, or when temperatures are above or below manufacturer's recommended limitations for installation or excessive moisture is present.

B. Proceed with this work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength, and so sealant will not be subjected to excessive elongation and bond stresses.

PART 2 - PRODUCTS

2.01 MATERIALS - GENERAL

A. Exterior Caulking Compound: Silicone sealant. The following are approved. All others require pre-bid approval per Instructions to Bidders and Section 01600 Material and Equipment - Substitutions. Color to be selected by Architect.
   1. Sonneborn: OmniPlus
   2. GE: Silpruf 2000
   3. Dow Corning: 795

B. Interior Caulking Compound: Latex-rubber-modified, acrylic-emulsion-polymer sealant, permanently flexible, non-staining and non-bleeding. The following are approved. All others require approval per Instructions to Bidders and Section 01600 Material and Equipment - Substitutions. Color to be selected by Architect.
   1. AC-20 Acrylic Latex, manufactured by Pecora Chemical Corp.
   2. Chem-Calk 600, manufactured by Woodmont Products, Inc.
   3. Sonolac, manufactured by Sonneborn.

C. Foot Traffic Joints (except as detailed otherwise): Polyurethane-based, complying with FS TT-S-00230C, Class A, type 1 (self-leveling). Colors shall be gray. The following are approved: All others require pre-bid approval.
   1. Sonneborn-Sonolastic SL-1.
   2. NR-201 Urexpan by Pecora.

D. Back-Up for Joints in Hollow Metal and Aluminum Frames: Resilient type such as resilient foam rod, sponge rubber hose or rod stock, or supporting type such as cork or non-pregnated fiber board.

E. Back-Up Material for Joints in Masonry and Use at Joints Between Dissimilar Materials: Resilient, open cell foam rod, or approved equal.

F. Caulking Primer: As recommended by manufacturer of caulking compound.

G. Bond Breakers: Polyethylene tape, or equal as recommended by manufacturer of caulking compound.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Employ only qualified workmen, skilled in this type of work.

3.02 EXAMINATION

A. Examine surfaces that are to be caulked. Report unsatisfactory conditions. Before beginning caulking make sure clear liquid sealers used on precast concrete panels have been mechanically removed from all surfaces which are to receive caulking compounds.

B. Do not start caulking until unsatisfactory conditions have been corrected.

C. Proceeding with installation of caulking will be construed as evidence of acceptance of conditions under which work will be done. Establish maximum caulking joint at window walls.

3.03 PROTECTION

A. Protect adjacent surfaces from damage, soiling and adhering of compound.

B. Protect caulked surfaces from scratching, scraping and puncturing.

3.04 PREPARATION

A. Properly prepare joints and surfaces to receive caulking compound. Mask or protect as necessary to prevent smearing adjacent surfaces.

B. Remove dust, soil, moisture, rust, grease and loose foreign materials that could interfere with caulking.

C. Rake mortared or grouted joints requiring caulking as necessary to obtain minimum of 1/4 inch for caulking. Maintain caulking width of not more than dimension indicated.

D. Complete caulking before finish painting is started.

3.05 INSTALLATION

A. Comply with compound manufacturer's printed installation recommendations except where more stringent requirements are shown on Drawings or specified.

B. Prior to applying caulking compound, clean and prime all joint surfaces in accordance with manufacturer's recommendations.

C. Apply bond breakers where specified and wherever required by manufacturer's recommendations to ensure that compound will perform properly.

D. Pack joints with specified backer as required. Install specified gaskets and other materials as detailed.

E. Apply compound with gun having nozzles of proper size and shape for joint required. Use sufficient pressure to fill all of joint leaving no voids. Superficial pointing of joints with a slim bead will not be accepted. Do not permit excess caulking or priming material to remain on exposed faces of adjacent surfaces. Do not trim edges of caulking with knife or instrument after joints have been tooled.

F. Finish joints to a slightly concave surface, unless specified or shown otherwise.

G. Remove excess caulking and leave surface of applied compound neat, smooth and clean. All caulked joints shall be watertight and conform in size and shape to that indicated on Drawings or as required to render the building watertight.

H. Use only colors matching approved samples.

3.06 CAULKING JOINTS IN EXTERIOR SURFACES

A. Apply bond breakers where required to prevent adhesion of compound to back of joint.

B. Pack joints where a suitable backing has not been provided with specified backing material of proper dimensions, to allow for the correct balance of joint and compound dimensions. Regulate joint width to depth proportions generally as follows:

WIDTH	DEPTH
1/4"(-)	1/4"
1/4" to 1/2"	Same as width dimension
1/2"to 1"	1/2"
1"(+)	Half of width dimension

C. Install caulking compound as specified under "Installing" above.

3.07 CAULKING PERIMETER JOINTS IN EXTERIOR DOORS AND WINDOWS

A. Pack joints more than 1/2 inch deep and joints not properly backed with specified backing material to 1/4 inch of adjacent surface.

B. Caulk both sides of frame. Provide completely weathertight joint securely adhered to frame and surrounding surface. Set threshold, saddles, and sills in non-sag compound.

C. Install caulking compound as specified under "Installing" above.

3.08 CAULKING FOOT TRAFFIC BEARING JOINTS

A. For joints in floors, walks and paving sealed with elastomeric caulking compounds, fill joint to a depth equal to 75% of joint width, but not more than 3/4 inch deep nor less than 3/8 inch deep.

B. Install compound as specified under "Installing" above. Bring finish compound surface to height slightly below adjoining surfaces.

3.09 CLEAN-UP

A. Remove soil, stain and extraneous material, caused by caulking work, from adjacent surfaces. Use only solvents or cleaning agents recommended in writing by caulking compound manufacturer.

B. Repair or remove and replace damaged, defective or sloppy work.

C. Remove and replace adjacent work that cannot be satisfactorily cleaned.

END OF SECTION

SECTION 08113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section “Flush Wood Doors”.
4. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
5. Division 08 Section "Door Hardware".
6. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.

10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40” above sill) or UL 10C.

1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
3. Smoke Control Door Assemblies: Comply with NFPA 105.

    a. Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

E. Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to ICC 500 (2014/2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

1. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 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.

B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:

1. CECO Door Products (C).
2. Curries Company (CU).

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard polystyrene. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.

5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. Curries Company (CU) - Polystyrene Core - 707 Series.

2.4 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
3. Manufacturers Basis of Design:

a. Curries Company (CU) – M Series.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
3. Manufacturers Basis of Design:

a. Curries Company (CU) - CM Series.
b. Curries Company (CU) - M Series.

D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 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.

2.6 LOUVERS

A. Metal Louvers: Unless otherwise indicated provide louvers to meet the following requirements.

1. Blade Type: Vision proof inverted V or inverted Y.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.
2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.7 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator’s shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.

D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.9 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 Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

    a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
9. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

10. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.10 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

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

3.2 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.

1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

3.5 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION 08113

SECTION 08210
WOOD DOORS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Wood doors, fire rated and non-rated - doors to be prefinished.

1.02 DESCRIPTION OF WORK

A. Extent and location of each type of wood door is shown on drawings and in schedules.

B. Types of doors required include the following:
   1. Solid core flush wood doors with veneer faces, prefinished.

1.03 QUALITY ASSURANCE

A. Conform to requirements of AWI Quality Standard Section 1300 and 1400 Premium Grade. ANSI/NWMA I.S.1.

B. Fire Door Construction: Conform to ASTM E152, NFPA 252, and UL 10B.

C. Installed Doors: Conform to NFPA 80 "Standard for Fire Doors and Windows" and which have been tested and rated with single point hardware by UL.

D. Non-Fire Rated Wood Doors: NWMA Industry Standard I.S.-1 "Wood Flush Doors" of the National Woodwork Manufacturer's Association.

E. Factory mark each door with NWMA "Quality Certified" Seal of Approval for conformance with NWMA I.S.-1.

F. Provide UL label on each fire-rated door and panel.

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable building codes for fire rated doors and panels.

1.05 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate door elevations, stile and rail reinforcement, internal blocking for hardware attachment, and cutouts for glazing and louvers. As applicable per drawings.

C. Specific Product Warranty: Submit written agreement in door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or which show photographing of construction below in face veneers, or do not conform to tolerance limitations of NWMA.
   1. The warranty shall also include refinishing and reinstallation which may be required due to repair or replacement of defective doors.
   2. Warranty shall be in effect during following periods of time after date of substantial completion.
      Solid Core Flush Interior Doors: Five years.

D. Submit manufacturer's certificate under provisions of Section 01400 that doors and louvers meet or exceed specified fire rated requirements.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect wood doors during transit storage and handling to prevent damage, soiling and deterioration. Comply with the "On-Site Care" recommendations of NWMA pamphlet "Care and Finishing of Wood Doors" and with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 DOOR TYPES & MANUFACTURERS

A. Flush Interior Doors: 1 3/4 inches thick; solid core construction; wood veneer faces, fire rated as indicated.

B. Manufacturers approved for bidding are IPIK, VT Industries or Marshfield Door Systems, Inc.:

Marshfield Door Systems
1401 East Fourth Street
Marshfield, WI 54449-7780
800-869-3667

VT Industries
1000 Industrial Park, Holstein, IA 51025
712-368-4381

IPIK Doors, Inc.
P. O. Box 250, Kenner, LA 70063
504-469-3666

2.02 DOOR AND PANEL CONSTRUCTION AWI QUALITY Standard

A. Solid, Non-Rated Core: AWI Section 1300, stave lumber (SLC). Structural composite lumber (SCL) may be substituted for stave lumber. Particleboard is not acceptable.

B. Solid, Fire Rated Core: AWI Section 1300, as required per Drawings.

C. Assemble doors by hot pressing face veneers and bonding cores.

D. Provide 5" x 12 " lock block for exit devices and mortise locks.

2.03 FLUSH DOOR FACING

A. Facing Quality: AWI premium.

B. Flush Interior Door Veneer:
White Birch
Finish : **To Match Existing In All Respects.**

2.04 ADHESIVES

A. Interior Doors: AWI, ANSI/NWMA, Type II.

2.05 ACCESSORIES

A. Glass Stops: Rolled metal type designed to conform to UL requirements.

B. Metal Louvers: Mechanical Contractor shall provide metal louvers as indicated on drawings or specified.

2.06 FABRICATION

A. Fabricate non-rated doors in accordance with AWI Quality Standards requirements.

B. Fabricate fire rated doors in accordance with AWI Quality Standards and to UL requirements. Attach fire rating label to door edge.

C. Provide flush doors with ½ inch thick edge strips of wood species to match face veneer.

D. Premachine doors for finish hardware.

E. Provide Z- or T- shaped metal astragals in one piece to UL requirements for double fire doors to rating required.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install doors in accordance with manufacturer's instructions.

B. Machine cut relief for hinges and closers and coring for handsets and cylinders.

C. Trim door width by cutting equally on top and bottom edges to a maximum of 3/16 inch.

D. Trim door height by cutting equally on top and bottom edges to a maximum of 3/4 inch. Trim fire door height at bottom edge only, to a maximum of one inch.

E. Pilot drill screw and bolt holes.

F. Prepare doors to receive finish hardware in accordance with AWI requirements.

G. Install door louvers as instructed per plans.

3.02 INSTALLATION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.03 ADJUSTING AND CLEANING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08305
ACCESS PANELS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Rated or non rated access doors and frames as required per plans. ***Allow for 4 additional rated access doors (location to be determined).***
Where attic access is shown thru the 1 hour gypsum protection on the trusses, these access panels shall be 1 hour rated 20" X 30" minimum opening per IBC.

1.02 QUALITY ASSURANCE

A. Manufacture access doors and frames to conform to UL requirements.

B. Provide labels indicating rating where access doors are located in fire rated walls or ceilings.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 01300.

1.04 WARRANTY

A. Access panels shall have five year warranty against defects of material or workmanship.

PART 2 - PRODUCTS

2.01 FABRICATION

A. Fabricate frames and flanges of 16 gage 1.5 steel and door panels of gage steel; pan insulated with non-combustible filler.

B. Weld, fill and grind joints to assure flush and square unit.

C. Hardware: 175 degree steel hinges with screw driver slot, quarter turn cam lock.

D. Prime and coat units with baked enamel finish.

2.02 ACCEPTABLE MANUFACTURER'S

A. Panels shall be Nystrom Building Products (1-800-547-2635), Karp Associates or J. L. Industries - fire rated, exterior application Access Panels.

C. Approved equal to be submitted under provisions of 01600.

PART 3 - EXECUTION

3.01 INSPECTION

A. Install plumb and level in wall, ceiling opening or floor openings.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install plumb and level in wall, ceiling opening or floor openings.

B. Position to provide convenient access to concealed work requiring access at walls and ceiling.

C. Install and secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

SECTION 08349

RADIATION SHIELDING DOOR AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufactures that are not current members of the Steel Door Institute.

E. Informational Submittals:

1. Certificates of Compliance: Submit any information necessary to indicate compliance with this specification section.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver radiation shielding 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 radiation shielding 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- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.5 COORDINATION

A. Coordinate installation of anchorages for radiation shielding 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.

1.6 WARRANTY

A. Provide manufacturer's written 5 year warranty against defects in materials and workmanship upon final completion and acceptance of Work in this section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. CECO Door Products (C).
2. Curries Company (CU).

B. Substitutions: Material from alternate radiation shielding door and frame fabricators will not be accepted on jobsite without prior written and sample approval in accordance with requirements specified in Division 01.

2.2 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

B. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Lead Glazing: Comply with requirements in Division 08 Section, "Glazing."

2.3 RADIATION SHIELDING DOORS

A. General: Provide 1-3/4 inch doors of type and design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard vertical steel-stiffener core.

    a. Standard Vertical Steel-Stiffener Core: Minimum 22 gage steel-stiffeners at 6 inches on-center construction attached by spot welds spaced not more than 5" on centers.
    b. Lead Core: Rolled pure sheet lead conforming to ASTM B749.

        1) Provide cores with minimum thickness sheet lead as specified:

            a) 1/32-inch.
            b) 1/16-inch.
            c) 1/8-inch.

    c. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gage (0.053-inch - 1.3-mm) thick steel, Model 2 (Fully welded, seamless face and edges).
4. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gage (0.053-inch - 1.3-mm), extending the full width of the door and welded to the face sheet. Finish top and bottom to provide a smooth flush condition.
6. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

2.4 RADIATION SHIELDING FRAMES

A. General: Provide frames of the type and profile indicated, not less than thickness indicated; to comply with ANSI/SDI A250.8.

1. Fabricate frames with mitered corners.
2. Fabricate frames with "closed and tight" mitered, full depth continuously welded seams, finished smooth with no visible seam unless otherwise indicated. Knock down type frames are not permitted.
3. Minimum 16 gage (0.053-inch -1.3-mm) thick steel sheet
4. Lead-lining: Rolled pure sheet lead conforming to ASTM B749, matching sheet thickness specified for lead door cores.

B. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

C. Surface Applied Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup anchors to suit frame size, not less than 16 (0.8 mm) gage thickness, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud Wall Type: Designed to engage stud and not less than 16 gage (0.8 mm) thickness.

B. Floor Anchors: Floor anchors to be provided at each jamb. Formed from same material as frames, not less than 14 gage (0.067-inch -1.7-mm) thick.

C. Mortar Guards: Provide minimum 26 gage mortar guards welded to the back of each hardware cutout.

2.6 STOPS AND GLAZED LITES

A. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Factory installed, minimum 16 gauge (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.

2.7 FABRICATION

A. Fabricate radiation shielding 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 radiation shielding work to tolerances indicated in ANSI/SDI A250.8.

C. Radiation Shielding Doors:

1. Glazed Lites: Factory cut openings in doors with applied flush trim kit to fit.
2. Astragals: Provide lead-lined overlapping astragals on one leaf of pairs of doors where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted.
3. Continuous Hinge Reinforcement: Provide welded continuous 12 gage strap for continuous hinges specified in hardware sets in Division 08 Section, "Door Hardware".

D. Radiation Shielding Frames: 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.

1. Welded Frames: Full depth continuously weld frame seams; grind, fill, dress, and make smooth and flush.

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.

2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. High Frequency Hinge Reinforcement: Provide 12 gage angle reinforcements for butt type hinges on every door and frame assembly.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gage straps for continuous hinges specified in hardware sets in Division 08 Section, "Door Hardware".
5. Electrical Knock Out Boxes: Factory weld 18 gage electrical knock out boxes to frame for electrical hardware preps; this includes but not limited to electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as noted in door hardware sets in Division 08 Section, "Door Hardware".

    a. Provide electrical knock out boxes as required for Project.
    b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
    c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section, "Door Hardware".
    d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
7. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry and Stud Wall Types: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 84 inches (2137 mm) high.

E. Surface Hardware Preparation: Factory prepare radiation shielding 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 radiation shielding work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

F. Stops and Moldings: Provide factory installed stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of radiation shielding work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so glazed lites are capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

2.8 STEEL FINISHES

A. Prime Finish: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded radiation shielding frames for squareness, alignment, twist, and plumbness.

C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install radiation shielding work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Radiation Shielding Frames: Install radiation shielding frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

a. At fire-protection-rated openings, install frames according to NFPA 80.

b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable glazing stops located on secure side of opening.
d. Install door silencers in frames before grouting.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with appropriate mortar.
4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Radiation Shielding Doors: Fit radiation shielding doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
c. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Division 08 Section, "Glazing" and with door manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including radiation shielding work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from radiation shielding work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

3.5 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION 08349

SECTION 08 560
VINYL WINDOWS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Casement Windows

B. Double-Hung Windows

C. Horizontal Sliding Windows

D. Single-Hung Tilt Windows

1.2 REFERENCES

A. American Architectural Manufacturer Association (AAMA)

1. ANSI/AAMA/NWWDA 101/I.S.2 /NAFS; Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors

2.

B. National Fenestration Rating Council (NFRC)

1. NFRC 100; Procedure for Determining Fenestration Thermal Properties

2. NFRC 200; Solar Heat Gain Coefficient and Visible Transmittance

1.3 DESIGN REQUIREMENTS

A. Provide windows capable of complying with requirements indicated, based on testing manufacturer's window that are representative of those specified and that are of test size required by ANSI/AAMA/NWWDA 101 I.S.2/NAFS.

B. Structural Requirements – Provide windows capable of complying with requirements indicated:

1. Design pressure: per IBC 2021

2.

1.4 SUBMITTALS

A. Refer to Section 01300.

B. Product Data: Submit window manufacturer current product literature, including installation instruction.

C. Samples: Provide finish samples for all products.

D. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.

2. Manufacturer Instructions: Provide manufacturer's written installation instructions.

E. Closeout Submittals

1. Refer to Section 01700.

1.5 QUALITY ASSURANCE

A. Certifications

1. Installer shall have successfully completed training through JELD-WEN's Product Integrity Group approved installation method course.

B. Mock-ups

1. Window mock-up shall incorporate surrounding construction, including wall assembly fasteners, flashing, and other related accessories installed in accordance with window manufacturer's approved installation methods.

a. Mock-up size: Any one of the windows as indicated on Drawings.
b. Mock-up may remain as part of the work.
c.

C. Pre-Installation Meeting

1. Refer to Section 01200.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Section 01600 – Material & Equipment.

B. Deliver windows materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Store windows as recommended by manufacturer.

1.7 WARRANTY

A. Refer to Section 01700 – Contract Closeout.

B. Manufacturer standard warranty indicating that the window unit will be free from material and workmanship defects from the date of substantial completion for the time periods indicated below:

C.

1. Window Unit: Lifetime.

2.

3. Glazing:

a. Insulated Glass: Lifetime against seal breakage
b. Laminated Glass & Specialty Glazing: 5 years against delamination

4.

PART 2 - PRODUCTS

1.1 MANUFACTURER

A. JELD-WEN® Windows and Doors; 3250 Lakeport Blvd. P.O. Box 1329; Klamath Falls, OR 97601-0268, USA; Phone 541.885.7412, fax 541.884.3331; Toll free 800.535. 3936; website www.jeld-wen.com

B. Basis of Design: Windows are based on the JELD-WEN®'s Vinyl Windows.

C. Substitutions as per Instruction to Bidders and Section 01600.

1.2 MANUFACTURED UNITS

A. Frame

1. Jamb Depth
   a) Casement Windows: 3-3/8" (85.725mm)
   b) Double- Hung Windows: 3-11/16" (93.6625mm)
   c) Single Hung Tilt Windows: 3-1/16" (77.7875mm)
   d) Fixed Picture Window

B. Sash

1. Thickness

a.

   a) Casement Windows: 2-1/2"
   b) Double-Hung Windows: 1-1/2" (38.1mm)
   c) Single-Hung Tilt Windows: 1-1/2" (38.1mm)
   d) Fixed Picture Window

C. Exterior Trim: Integral Brickmould J-channel

1. Options: Extension Jamb Retainer,Drywall Retainer, and Drip Cap.

D. Extension Jambs: Provide at all four sides of frame as required per Drawings and for complete installation..

E. Weatherstripping

1. Casement Windows: .270 fin pile combined with foam filled bulb

2. Double-Hung Windows: .270 fin pile

3. Single-Hung Tilt Windows: .270 fin pile

4.

F. Hardware

1. Casement Windows
   a) Lock: Concealed multi-point lock
   b) Handle Profile *(standard)*: Manual Folding Crank
   c) Finish: Color match frame extrusion

b.

2. Double-Hung Windows
   a) Balance: Block and Tackle Balance System
   b) Lock: Cam Lock
   c) Finish: Color match window frame extrusion

3. Single-Hung Tilt Windows
   a) Balance: Block and Tackle Balance System
   b) Lock: Tilt latches and *standard:* WEN-Lock™
   c) Finish: Color match window frame extrusion

G. Glazing

1. Strength: *standard:* Annealed [*options*: Tempered- where required to meet IBC 2009

2. Insulated Glass *(standard):*
   a) Two panes of glass utilizing a continuous roll formed stainless steel and dual seal sealant.
   b) Type: [*standard:* Type 1- Clear] [*options:* [Type 2 – Tinted [Azurlite] [Bronze] [Gray]] [Specialty Glass – Obscure] [Glue Chip] [Rain]]
   c) Coating Options: [**Low E on surface 2]**

b.

1.3 WINDOW ACCESSORIES

A. Insect Screens

1. Material: Charcoal fiberglass screen cloth set in painted roll formed aluminum frame.

a. Frame Finish: Color match window frame extrusion.

B. Grilles

1. Simulated Divided Lites (SDL)

a. Exterior Muntins
   1) Material: Extruded aluminum contoured muntin permanently applied to exterior of insulating glass unit.
   2) Pattern: As selected by Architect
   3) Width: 7/8” (22.2 mm)
   4) Finish: Match exterior finish

1.4 CONSTRUCTION ACCESSORIES

A. Flashing

1. Refer to Section 07600 – Flashing.

B. Sealants

1. Refer to Section 07951 – Caulking & Sealants.

1.5 FABRICATION

A. General:

B. Casement Windows & Single Hung Tilt Windows.

1. Frame: Heat fusion welded corners

2. Sash: Heat fusion welded corners

3. Glass: Mounted with silicone glazing compound and /or glazing tape

1.6 FINISH

a.

B. 1. Color: White Standard.

PART 3 - EXECUTION

1.1 GENERAL

A. Install windows in accordance with manufacturer's installation guidelines and recommendations.

B.

1.2 EXAMINATION

A. Inspect window prior to installation.

1.

B. Inspect rough opening for compliance with window manufacturer recommendations. Verify rough opening conditions are within recommended tolerances.

1.

1.3 PREPARATION

A. Prepare windows for installation in accordance with manufacturer's recommendations.

B.

1.4 INSTALLATION

1.

B. Insert window into rough opening:

1. Shim side jambs straight.
2. Inspect window for square, level and plumb.
3. Fasten window through jamb, shim and into rough opening jamb.
4. Test and adjust for smooth operation of window.
5. Ensure weep holes are clear of debris for proper drainage.

C.

1.5 CLEANING

A. Remove Preserve® film from glass.

B. Clean the exterior surface and glass with mild soap and water.

C.

1.6 PROTECTION

A. Protect installed windows from damage.

B.

END OF SECTION

SECTION 08712

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “Hollow Metal Doors and Frames”.
2. Division 08 Section “Flush Wood Doors”.
3. Division 08 Section “Radiation Shielding Doors and Frames”.
4. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.

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 as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.

3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

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

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

C. 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.

D. 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.

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

1.4 QUALITY ASSURANCE

A. Hardware Supplier and Hardware Installer must obtain a license with the Louisiana Office of State Fire Marshall in accordance to RS 40:1464 and RS 40:1664.

B. 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.

C. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

D. 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.

E. 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.

F. 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.

G. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

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

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

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

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of

their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door 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.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.

3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Please note that ASSA ABLOY is transitioning the Yale Commercial brand to ASSA ABLOY ACCENTRA. This affects only the brand name; the products and product numbers will remain unchanged. The brand transition is expected to be complete in or about May of 2024, and products shipping after that time will be branded ASSA ABLOY ACCENTRA.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 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: With the exception of electric through wire hinges, 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 (MK) - TA/T4A Series, 5-knuckle.

2.3 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:.

   a. Pemko (PE).

2.4 FLOOR CLOSERS AND PIVOTS

A. Pivots: ANSI/BHMA A156.4, Grade 1; space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.

1. Manufacturers:

   a. Norton Rixson (RF).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.

4. Tubular deadlocks and other auxiliary locks.
5. 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.
6. Keyway: Match Facility Standard.

C. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "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 cylinders to match Owner's existing system.

D. 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).

E. 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.

2.6 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Electromechanical locksets shall have the following functions and features:

a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
c. Options to be available for request-to-exit or enter signaling, latchbolt and deadbolt monitoring.
d. Two-year limited warranty on electrified functions.

2. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 5400LN Series.

2.7 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.

2.8 CONVENTIONAL EXIT DEVICES

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

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Security Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed rim panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be constructed of high grade, heat treated, corrosion resistant nickel steel alloy, and have a full 3/4" throw projection with slide action positive deadlocking.

1. Static Load Force Resistance: Minimum 3000 lbs. certified independent tested.

2. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 7050 Series.

2.9 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.
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. 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 Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. 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 (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:

a. ASSA ABLOY ACCENTRA, formerly known as Yale (YA) - 3500 Series.

2.10 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 protection plates (kick, armor, or mop), fabricated from the following:

    a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

    a. Rockwood (RO).

2.11 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 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

    a. Rockwood (RO).

2.12 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 NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

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

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

F. Manufacturers:

1. Pemko (PE).

2.13 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.

2.14 FINISHES

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

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

3.2 PREPARATION

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

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

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

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

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

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

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

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

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

3.7 DEMONSTRATION

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

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RF - Rixson
4. YA - ASSA ABLOY ACCENTRA
5. RO - Rockwood

Hardware Sets based on plans dated 02/23/2024
Match existing keying

Set: 1.0
Doors: 102
Description: Sgl Ext. Exit - HM

1	Continuous Hinge	CFM_HD1	PE

1	Rim Exit Device, Nightlatch	7150 AU627F MK	630	YA
1	Surface Closer	UNI3501 (Brackets/spacer as req'd)	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
1	Sweep	315CN x Width		PE
1	Threshold	2005AT		PE

Set: 2.0
Doors: 108
Description: Sgl Ext. Lock - HM

1	Continuous Hinge	CFM_HD1		PE
1	Storeroom or Closet Lock	AU 5405LN MK	626	YA
1	Surface Closer	UNI3501 (Brackets/spacer as req'd)	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
1	Sweep	315CN x Width		PE
1	Threshold	2005AT		PE

Set: 3.0
Doors: 104A, 107A
Description: Sgl Ext. Lock - HM - Inswing

1	Continuous Hinge	CFM_HD1		PE
1	Storeroom or Closet Lock	AU 5405LN MK	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO
1	Rain Guard	346C width plus 4"		PE
1	Gasketing	2891APK		PE
1	Sweep	315CN x Width		PE
1	Threshold	171A		PE

Set: 4.0
Doors: 103
Description: Int Sgl Classroom

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Classroom Lock	AU 5408LN MK	626	YA
1	Door Stop	406/409/441H Per Conditions	US26D	RO
3	Silencer	608		RO

Set: 5.0
Doors: 101, 106
Description: Passage

3	Hinge, Full Mortise	TA2714	US26D	MK
1	Passage Latch	AU 5401LN	626	YA
1	Door Stop	406/409/441H Per Conditions	US26D	RO
3	Silencer	608		RO

Set: 6.0
Doors: 104, 107
Description: Lead-lined Passage - Closer

1	Pivot Set	L147	626	RF
1	Intermediate Pivot	ML19	626	RF
1	Passage Latch	AU 5401LN Lead Shielded	626	YA
1	Surface Closer	3501	689	YA
1	Kick Plate	K1050 10" BEV CSK	US32D	RO
1	Door Stop	406/409/441H Per Conditions	US26D	RO
3	Silencer	608		RO

END OF SECTION 08712

SECTION 08800
GLASS AND GLAZING

PART 1 - GENERAL

1.01 GENERAL

A. Install glazing where shown on drawings and specified in section 08920.

1.02 STANDARDS

A. Meet requirements and recommendations of applicable portions of Standards listed:
1. American National Standards Institute. ANSI
2. Consumer Products Safety Council. CPSC
3. Flat Glass Manufacturers Association. FGMA
4. Federal Specifications. FS
5. Governing Codes and Ordinances
6. National Glass Association

B. In-place glazing shall withstand the following wind loads acting normal to plane of glass surface:
1. Less than 30 feet above grade:
a. 30 p.s.f. positive pressure (acting inward)
b. 30 p.s.f. negative pressure (acting outward)
2. 31 to 60 feet above grade:
a. 40 p.s.f. positive pressure
b. 40 p.s.f. negative pressure

C. Install tempered glass at all glass entrances and adjoining sidelites and panes within 18 inch above a walkway surface unless in rated walls and doors.

D. Install wire glass in rated walls and doors. See Fire Plan.

1.03 WEATHER CONDITIONS

A. Do not proceed with installation of liquid sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed with glazing only when forecasted weather conditions are favorable to proper cure and development of high early bond strength.

1.04 SUBMITTALS

A. Physical Samples: Submit for Architect review and approval the following items: Tinted glass and wired glass. Samples will be reviewed by Architect for appearance only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

B. Manufacturer's Literature: Submit two copies of manufacturer's specifications, recommendations and installation instructions for each type of glazing sealant and compound, gasket and associated miscellaneous material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the applications shown. Show by transmittal that one copy of each recommendation and instruction has been distributed to the Glazer.

1.05 WARRANTY

A. By accepting this Contract, the Contractor agrees to warrant his work for one year against becoming unserviceable or objectionable in appearance as a result of being defective or non-conforming. Without limiting the warranty scope, the work shall be warranted not to leak or to break due to faulty installation.

PART 2 - PRODUCTS

2.01 GLASS

A. Plate Glass: Clear float glass, complying with FS DD-G-451, Type 1, Class 1, Quality 3, 1/4 inch thick. Products offered by manufacturers complying with requirements include the following:
1. ASG Float or Starlux; ASG Industries, Inc.
2. Clear Float; Ford Glass Division.
3. Parallel-O-Float or Parallel-0-Plate; Libby-Owens-Ford Company.
4. Clear Float; PPG Industries.
5. Substitutions: Section 01600 - Material and Equipment and Instructions to Bidders, Equal Products.

2.02 TREATED OR FLOAT GLASS

A. Float Glass: ASTM C1036, Type I (transparent glass, flat)

2.03 TEMPERED GLASS

A. Quality of Glass for Treatment: Furnish glass for tempering and heat strengthening which complies with FS DD-G-451, for type, thickness, class, and color indicated or specified.

B. Tempered Glass:
1. Temper glass by manufacturer's standard process to increase strength to not less than four times strength prior to tempering.
2. Tolerances for flatness in any direction, any location except 2 inches wide border, for 1/4 inch thick glass (with inversely proportionate tolerances for thicker glass) shall not exceed the following:
a. For 1'-0" run: 1/16" bow
b. For 3'-0" run: 1/8" bow
c. For 7'-0" run: 1/4" bow
d. For 10'-0" run: 3/8" bow
3. Thickness - 1/4 inch minimum.
4. Cut, fabricate or drill all tempered glass before tempering.
5. Tong Marks: Support each piece of glass during strengthening so that tong marks will be concealed by glazing system.

2.04 FIRE RATED GLASS

A. Products equal to Technical Glass Products meeting UL tests for rating of doors *(see door schedule*) or walls where located *(see fire plan)*. Glazing shall be clear and impact safety rated - FireLite Plus.

B. Install in rated frames using approved glazing compound recommended by manufacturer.

C. Glass shall bear label with the UL logo and fire rating.

2.05 SHEET MIRRORS

A. 1/4 minimum float glass with silver coating.

B. Edges shall be seamed (sanded smooth)

2.06 LAMINATED TRANSLUCENT GLASS **(OPTIONAL IF APPROVED BY ARCHITECT)**

A. 0.045 innerlayer film laminated between two 1/4" thick clear tempered glass units. All edges to be polished. (Film to be selected by architect as to amount of light that is filtered through. Provide a minimum of six different samples to be selected from.)

2.07 DECORATIVE GLASS (ETCHED)

A. Acid-etched glass with decorative pattern etched into glass with hydrofluoric and hydrochloric acids, evenly applied, according to manufacturer's standard process.

B. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
   1. Walker Glass

C. Glass Type: Clear fully tempered.

D. Glass Thickness: ½" minimum.

E. Patterns: As selected by Architect from manufacturer's standards.

F. Silicone Back Coating: As recommended by manufacturer.

2.08 OTHER GLAZING MATERIALS

A. Butyl Rubber Glazing Tape: Synthetic polymer based, non- shrinking 100% solid compound, 1/8 inch thick minimum.

B. Elastic Glazing Compound for Channel Glazing: Two parts polysulfide sealant complying with FS TT-S-227, Class A, Type 2; compounded and tested to show a minimum of 20 years resistance to deterioration in normal glazing applications.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces and items that are to receive glass. Correct unsatisfactory conditions.

B. Correct defects that could interfere with proper glazing. Correct warped planes that could place glass in a strain when installed. Do not start glazing until unsatisfactory conditions have been corrected and approved.

C. Proceeding with glazing work will be construed as evidence that surfaces to receive glass are in condition to permit satisfactory installation.

3.02 WORKING REQUIREMENTS

A. Handle glass and glazing materials to avoid damage to materials or to work in place. Satisfactorily repair or remove and replace work that has been damaged.

B. Protect glass from scratching, breaking or other injury while storing, during installation and until work is completed.

C. Install temporary coverings necessary to prevent damage to finished surfaces during construction. Tape, or temporarily paint, markings on installed glass sufficient to clearly indicate that glass is in place.

D. Do not remove labels from individual sheets of glass until glazing materials have been installed and approved.

E. Store and handle glass and glazing materials to prevent damage to materials or structure. Remove broken and scratched glass promptly from site.

3.03 PREPARATION

A. Cleaning
   1. Remove from glazing stops, legs or recesses, grease, oil, lacquer, dirt and other detrimental materials.
   2. Use methyl-ethyl-ketone (MEK) or other similar solvents not harmful to aluminum finish.

B. Conditions:
   1. Surface shall be dry and free from frost.
   2. Unless otherwise recommended by sealant manufacturer, air temperature at elevation at which glazing with liquid sealants is to take place shall be 40 degrees F or above.

3.04 SETTING BLOCKS

A. Required: For glass sizes in excess of 50 united inches.

B. Material: Neoprene; 70-90 Shore A durometer

C. Size: 1/8 inch minimum thickness; length to suit load

D. Location: At quarter points of sill

3.05 SPACER SHIMS

A. Required: For glass sizes in excess of 50 united inches

B. Omit: Where non-resilient tape is used and tape is sufficiently hard to resist squeezing out under wind load

C. Materials: Resilient neoprene; 40-50 Shore A durometer

D. Location: All four edges; on outside and inside; keep 1/4 inch below sight line; lap glass 1/8 minimum

E. Size: 1 inch minimum length

F. Number: Not less than two per edge; maximum 4'-0" o.c.

3.06 INSTALLING GLASS

A. Installations shall be in accordance with the standards of the FGMS Glazing Manual, latest edition.

3.07 EXTERIOR GLAZING

A. Install glazing in accordance with hollow metal framing and window manufacturer's recommendations for each framing type shown.

B. Install tempered glass where shown and elsewhere where required to meet CPSC safety standards and windloads.

3.08 GLAZING INTERIOR DOORS AND VISION PANELS

A. Glaze interior doors and vision panels with specified glass.

B. Shim glass as required to install tightly, without warp or stress.

3.09 DRY GLAZING

A. Install glass in aluminum entrances and frames using gaskets and materials supplied with system in accordance with aluminum frame manufacturer's recommendations.

B. Grind edges of sliding glass panels

3.11 WORKMANSHIP REQUIREMENTS

A. Glass shall be free of distortion caused by installation.

B. Glazing sealants shall be neatly formed and in proper place.

3.12 CLEANING

A. Remove soil, stain and extraneous materials caused by glazing from glass and adjacent surfaces. Replace items that cannot be satisfactorily cleaned.

B. Prior to completion of Project, remove labels, glazing materials, paint and other adhered materials from glass surfaces. Clean and polish surfaces of glass to be free from prints, soil, spots and foreign matter. Leave glass visibly clean when viewed from any angle.

C. Remove and replace glass that is scratched, cracked, broken, discolored or defective.

END OF SECTION

SECTION 09260
GYPSUM BOARD SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Metal channel ceiling framing.

B. Gypsum board where indicated on Drawings.

C. Taped and sanded joint treatment.

D. Asphalt Felts.

1.02 REFERENCES

A. ANSI/ASTM C36 - Gypsum Wallboard.

B. ANSI/ASTM C79 - Gypsum Sheathing Board.

C. ANSI/ASTM C442 - Gypsum Backing Board.

D. ANSI/ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.

E. ANSI/ASTM C514 - Nails for the Application of Gypsum Wallboard.

F. ANSI/ASTM C630 - Water Resistant Gypsum Backing Board.

G. ANSI/ASTM C645 - Non-Load Axial Bearing Steel Studs, Runners Track, and Rigid Furring Channels for Screw Application of Gypsum Board.

H. ANSI/ASTM C646 - Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gage Steel Studs.

I. ANSI/ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.

J. GA-201 - Gypsum Board for Walls and Ceilings.

K. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

1.03 SYSTEM DESCRIPTION

A. Acoustic Attenuation for Identified Interior Partitions: 45-51 STC in accordance with ANSI/ASTM E90.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate on shop drawings, special details associated with fireproofing and acoustic seals.

C. Submit manufacturer's installation instructions under provisions of Section 01300.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. United States Gypsum Co.

B. National Gypsum Co.

C. Georgia-Pacific

D. Substitutions: Under provision of Section 01600 and Instructions to Bidders.

2.02 GYPSUM BOARD MATERIALS

A. Fire Rated Gypsum Board: ANSI/ASTM C36; fire resistive, and moisture resistant type, UL rated; 5/8 inch thick, maximum permissible length; ends square cut, tapered edges. All board to be mold and mildew resistant.

B. Moisture Resistant Gypsum Board: ANSI/ASTM C630; 5/8 inch thick, maximum permissible length; ends square cut, tapered edges. (Fire Rated Gypsum Board). This shall be used at all toilet rooms, mens rooms, womens rooms, housekeeping rooms, and/or as indicated on Drawings. All board to be mold and mildew resistant.

2.03 ACCESSORIES

A. Corner Beads: Metal

B. Edge Trim: GA 201 and GA 216

C. Joint Materials: ANSI/ASTM C475; GA 201 and GA 216; reinforcing tape, joint compound, adhesive, water, and fasteners.

D. 30 lb. Asphalt Felt. **(Only as indicated on drawings.)**

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings and instructed by the manufacturer.

B. Beginning of installation means acceptance of existing surfaces and substrate.

3.02 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA 201 and GA 216 manufacturer's instructions.

B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.

D. Use screws when fastening gypsum board to metal furring or framing.

E. Double Layer Applications: Use gypsum backing board for first layer, placed perpendicular to framing or furring members. Use fire rated gypsum backing board for fire rated partitions. Place second layer perpendicular to first layer. Offset joints of second layer from joints of first layer.

F. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum ceiling board with sealant.

G. Place control joints consistent with lines of building spaces as specified unless shown otherwise on Drawings. Place control joints on **both sides of all window heads and door heads** extending to deck or top of wall.

H. Place corner beads at external corners as indicated. Use longest practical length. Place edge trim where gypsum board butts dissimilar materials as indicated.

I. Install 30 lb. Felt over sheathing in “ship lap” manner to shed water. Install as recommended by manufacturer..

3.03 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

C. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.

D. Taping, filling, and sanding shall be required for existing surfaces which may be damaged due to the removal of existing VWC or construction activities.

E. Install acoustical sealant on all partitions in strict accordance with manufacturer’s printed instructions and recommendations. (NOT TO BE USED with PVC.)

F. **All of the above shall be done to meet the - Level 4 - recommended specifications of the AWCI** included in GA 214-90:All joints and interior angles shall have tape embedded in joint compound and three separate coats of joint compound applied over all joints, angles, fastener heads and accessories..

3.04 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09511
SUSPENDED ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Suspended metal grid ceiling system.

B. Acoustical tile.

C. Vinyl Faced Gypsum Units.

D. Non-fire rated assembly.

E. Perimeter trim.

1.02 RELATED WORK

A. Wet-Pipe Sprinkler Systems: Sprinkler heads in ceiling system.

B. Air Outlets and Inlets: Air diffusion devices in ceiling system.

C. Building Lighting: Light fixtures in ceiling system.

1.03 REFERENCES

A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Provide product data on metal grid system components, and acoustic units.

C. Submit samples under provisions of Section 01300.

D. Submit two samples full size 24 x 24 inch in size, illustrating material and finish of acoustic units.

E. Submit two samples each, 12 inches long, of suspension system main runner, cross runner and edge trim.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and humidity of 20 to 40 percent prior to, during, and after installation.

1.06 SEQUENCING/SCHEDULING

A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Schedule installation of acoustic units after interior wet work is dry.

1.07 EXTRA STOCK

A. Provide extra quantity of acoustic units under provisions of Section 01700.

B. Provide cartons of extra tile, panels, and metal pans to Owner.

PART 2 - PRODUCTS

2.01 ALL MANUFACTURERS - CEILING GRIDS

A. Chicago Metalic Corp.

B. Armstrong World Industries, Inc.

C. USG Interiors, Inc.

D. Substitutions: Under provisions of Section 01600 and Instruction to Bidders.

2.02 SUSPENSION SYSTEM MATERIALS

A. Grid: ASTM C635, intermediate duty, non-fire rated exposed T; components die cut and interlocking.

B. Accessories: Stabilizer bars, clips, edge and moldings required for suspended grid system. Provide hold down clips where indicated on Drawings.

C. Grid Materials: Commercial quality hot dipped galvanized steel.

D. Grid Finish: Aluminum cap with standard white finish.

E. Support Channels and Hangers: Hot dipped galvanized steel; size and type to suit application, to rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

2.03 ACCEPTABLE MANUFACTURERS - ACOUSTIC UNITS

A. MATCH EXISTING IN ALL RESPECTS

B. Substitutions: See Instructions to Bidders and Section 01600 Material and Equipment: Substitutions.

2.04 ACOUSTIC UNIT MATERIALS- **SEE INTERIOR FINISH SCHEDULE**

A. Acoustic Panels: Conforming to the following:
1. Size: 24 x 24 inches
2. Thickness: 5/8 inches
3. Composition: Mineral
4. Light Reflectance: 83 percent
5. NRC Average: .55
6. CAC (Ceiling Attenuation Class) : minimum 33.
7. Flame Spread 0-25 ASTM E84
8. Edge: Square
9. Surface Color: White
10. Surface Finish: Perforated Non Directional Pattern
11. Sag Resistant.

2.07 MAINTENANCE STOCK

A. Furnish full size units matching the units installed packaged with protective covering for storage, and identified with appropriate labels. Furnish **one percent** of the amount installed.

2.08 VINYL FACED GYPSUM BOARD PANEL-

A. Type: Provide panels which are approved for kitchen use by USDA.

B. Pattern: Panel caracteristicsas follows:
   1. Color/Light Reflectance Coefficient: White/LR 0.80.
   2. Edge Detail: Square
   3. Size: 24 inches by 24 inches by 1/2 inch.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that existing conditions are ready to receive work.

B. Verify that layout of hangers will not interfere with other work.

C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install system in accordance with ASTM C636 manufacturer's instructions and as supplemented in this Section.

B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.

C. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

D. Supply hangers or inserts for installation to Section with instructions for their correct placement. If metal deck is not supplied with hanger tabs, coordinate the installation of hanger clips during steel deck erection. Provide additional hangers and inserts as required.

E. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Center system on room axis leaving equal border units according to reflected plan. Do not use less-than-half width units at borders. Where layouts will not allow less-than-half units, use 2 x 4 feet units and cut units as required.

H. Do not eccentrically load system, or produce rotation of runners.

I. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. provide edge moldings at junctions with other interruptions. Field rabbett tile edge. Where round obstructions occur, provide preformed closers to match edge molding.

J. Form expansion joints as detailed. Form to accommodate plus or minus one inch movement. Maintain visual closure.

K. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.

L. Install acoustic units level, in uniform plane, and free from twist, warp and dents.

M. Install hold-down clips to retain panels tight to grid system where shown on plans.

N. Furnish four hangers, one at each corner of each light fixture.

3.03 TOLERANCES

A. Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Variation from Plumb of Grid Members Caused by Eccentric Loads: Two degrees maximum.

C. Laser - level all ceilings.

END OF SECTION

SECTION 09650
RESILIENT FLOORING

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 DESCRIPTION OF WORK

A. Extent of resilient flooring and accessories is shown on Drawings and in schedules.

1.03 QUALITY ASSURANCE

A. Manufacturer: Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, and sealants.

B. No materials shall contain asbestos.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provision of Section 01300.

B. Product Data: Submit two copies of manufacturer's technical data and installation instructions for each type of resilient flooring and accessory.

C. Samples: Submit three sets of samples of each type, color, and finish of resilient flooring and accessory required, indicating full range of color and pattern variation. Provide full-size tile units, 12 inches square samples of sheet flooring, and 6 inches long samples of accessories.

D. Maintenance Instructions: Submit two copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.

E. Provide written test which is approved by manufacturer, verifying floor moisture content is acceptable.

1.05 JOB CONDITIONS:

A. Maintain minimum temperature of 65 degrees F in spaces to receive resilient flooring for at least 40 hours prior to installation, during installation, and for not less than 48 hours after installation. Subsequently, maintain minimum temperature of 55 degrees F in areas where work is completed.

B. Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Moisture content of concrete slabs and environmental conditions must be within limits recommended by manufacturer of products being installed.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - Vinyl Composition Tile & Luxury Vinyl Tile

A. **SEE INTERIOR FINISH PLAN & SCHEDULE**

B. Substitutions : Per Instructions to Bidders and Section 01600.

2.02 ACCEPTABLE MANUFACTURERS - Rubber Base

A. **SEE INTERIOR FINISH PLAN & SCHEDULE**

B. Substitutions : Per Instructions to Bidders and Section 01600.

C. Resilient Base

1. Lengths : Seamless , 120 foot rolls.

2. Pre molded interior and exterior corners.

2.03 MATERIALS

A. Colors and Patterns: As selected by Architect.

B. Vinyl :
1. In addition to that required for installation, provide for Owner's use one carton of each color and pattern used. (Four cartons)

C. Adhesives: Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

D. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

E. At control joints in slab or where needed use Hydroment Blacktop 90210 or equal waterproofing and anti-fracture membrane. Confirm that products are compatible with flooring materials and adhesives.

F. Moisture barrier primer (type as recommended by manufacture) shall be used for all flooring. *Note that general contractor is providing moisture barrier at installation of slabs (ground and upper floors) with guarantee - no additional should be required if compatible adhesive system is used. Contractor to coordinate before installing moisture barrier. Slab is to be tested as required by manufacturer.*

2.03 MAINTENANCE STOCK

A. At time of completing the installation, deliver stock of maintenance material to the Owner. Furnish full size units matching the units installed, packaged with protective covering for storage, and identified with appropriate labels. Furnish an amount equal to 1 percent of each type tile installed.

PART 3 - EXECUTION

3.01 INSPECTION

A. Installer must examine areas and conditions under which resilient flooring and accessories are to be installed and must notify Contractor in writing of conditions detrimental to proper and

timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

B. **NOTE: Remove all existing flooring prior to installation of new flooring.**

3.02 PREPARATION

A. Substrates must be dry, clean, smooth, and free from paint, varnish, wax, oils, solvents and other foreign matter.

Allow all flooring materials and adhesives to condition to the room temperature a minimum of 48 hours before starting the installation.

The area to receive resilient flooring should be maintained at a minimum of 65° F (18° C) and a maximum of 100° F (38° C) for 48 hours before, during and for 48 hours after completion.

During the service life of the floor the temperature should never fall below 55° F (13° C). The performance of the flooring material and adhesives can be adversely affected below this minimum temperature.

Conduct calcium chloride tests. Bond test should also be conducted for compatibility with the substrate.

B. Broom Clean or vacuum surfaces to be covered, and inspect subfloor. Start of flooring installation indicates acceptance of subfloor conditions and full responsibility for completed work.

C. Use leveling compound as recommended by flooring manufacturer for filling small cracks and depressions in subfloors. Contractor shall be required to provide all leveling as may be required due to the removal of existing carpet or VCT. If the removal process removes existing leveling compounds, contractor shall replace accordingly or as may be required for proper, level installation.

D. Perform moisture tests on concrete slabs to determine that concrete surfaces are sufficiently cured and ready to receive flooring. Moisture content must be approved by and meet requirement of flooring and adhesive manufacturer. Test to be documented and approved by manufacturer's representative before installation of flooring. *This contractor is responsible for applying a penetrating moisture blocker if required to accommodate flooring specifications for moisture content. If not used the credit for this moisture blocker will be returned to the owner. Product shall be compatible with concrete, it's admixtures and the floor tile adhesive.*

E. Apply concrete slab primer, if recommended by flooring manufacturer prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.03 INSTALLATION

A. General: Place flooring with adhesive cement in strict compliance with manufacturer's recommendations. Butt tightly to vertical surfaces, thresholds, nosings, and edgings. Scribe around obstructions to produce neat joints, laid tight, even, and straight. Extend flooring into toe spaces, door reveals, and into closets and similar openings.

B. Tile Floors:

1. Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room are of equal width. Adjust as necessary to

avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.

2. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged. Cut tile neatly around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable.
3. Lay tile in "checkerboard" fashion with grain reversed in adjacent tiles. Where existing floors require new tile because of work under this contract, remove existing tile to nearest full unit and begin installation of new, which shall match existing.

C. Apply resilient base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to backing throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

D. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.

3.04 CLEANING AND PROTECTION

A. Remove any excess adhesive or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer. Protect installed flooring with heavy Kraft paper or other covering.

1. Finishing: After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories. Apply polish and buff with type of polish, number of coats, and buffing procedures in compliance with flooring manufacturer's instructions.

END OF SECTION

SECTION 09900
PAINTING

PAR 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 - 16 Specification sections, apply to work specified in this Section.

1.02 DESCRIPTION OF WORK

A. The work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.

B. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

C. The work includes field painting of covered pipes and ducts (including color coding), and of hangers, including field cleaning and touch up, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated. **Painting of aboveground gas piping at Generator.**

D. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

E. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, miscellaneous metal, hollow metal work, and similar items. Also, for factory-built mechanical and electrical equipment and accessories.

F. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) metal toilet enclosures, acoustic materials, finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, doors and equipment.

G. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, pipe spaces, and duct shafts.

H. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.

I. Operating Parts and Labels: Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting, unless otherwise indicated.

J. Do not paint over any code-required labels, such as Underwriters' Laboratories" and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.

B. Samples: On actual wood surfaces, provide two 4 ax 8 inches samples of natural and stained wood finish. Label and identify each as to location and application.

1.04 DELIVERY AND STORAGE

A. Deliver materials to job site in original, new unopened packages and containers bearing manufacturer's name and label, and following information:

Name or title of material.
Fed. Spec. number, if applicable.
Manufacturer's stock number and date of manufacturer.
Manufacturer's name.
Contents by volume, for major pigment and vehicle
Thinning instructions.
Application instructions.
Color name and number.

B. Paint materials shall not be stored in the building, but shall be stored in a temporary building located at least 30 feet from the building.

1.05 JOB CONDITIONS

A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degree F, unless otherwise permitted by paint manufacturer's printed instructions.

B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F, unless otherwise permitted by paint manufacturer's printed instructions.

C. Do not apply paint in snow, rain, fog or mist; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.

D. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

1. ICI
2. Sherwin Williams
3. Coronado
4. Benjamin Moore Paints
5. Devoe

2.02 COLORS AND FINISHES

A. Prior to beginning work, Architect/Engineer will furnish color schedule for surfaces to be painted.

B. Surface treatment and painting are as hereinafter described.

C. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

D. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other Sections of these Specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect/Engineer in writing of any anticipated problems using specified coating systems with substrates primed by others.

2.03 MATERIAL QUALITY

A. Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

B. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

C. Provide undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

D. Paints shall not exceed 0.06% lead by weight.

2.04 EXTERIOR PAINT SYSTEMS

A. Not applicable to existing surfaces unaffected by work under this Contract

B. Ferrous Metal:
   1. 1st coat - Red lead pigmented primer
      a. Devoe #41821
      b. Sherwin Williams B50N2 or B50W1
   2. 2nd coat - gloss alkyd enamel
      a. Devoe 1XX
      b. Sherwin Williams A2 Series
   3. 3rd coat - gloss alkyd enamel
      a. Devoe 1XX
      b. Sherwin Williams A2 Series
   4. First coat not required on items delivered shop primed.
   5. For zinc coated metal, substitute zinc dust - zinc oxide primer Devoe #41839; Sherwin Williams - Galvite #B50W3 in lieu of red lead pigmented primer.

C. Galvanized Metal:
   1. 1st coat
      a. SW Galvite B50W3
      b. Devoe 13201 - Galvanized Metal Primer
   2. 2nd & 3rd coats
      a. SW SWP A2 Series
      b. Devoe 1XX

D. Paving (Stripping)
   1. Two coats Traffic Line paint, best grade.

E. Woodwork
   1. First Coat - Primer or Alkyd Enamel Undercoat
   2. Second and Third Coats - Gloss Latex with Mildew Resistance Additive

2.05 INTERIOR PAINT SYSTEMS

A. Not applicable to existing surfaces unaffected by work under this Contract.

B. Where existing surfaces are scratched, marred, damaged by work under this Contract, or where existing unpainted surfaces are uncovered by removal of items under this Contract, existing surfaces shall be painted to match existing adjacent similar materials. Painting shall be carried to nearest surface break in affected surface.

C. Gypsum Board: (All surfaces unless noted otherwise on drawings). Eggshell Emulsion Finish
1. 1st coat - Latex Bsed Interior White Primer (FS TT-650)
2. 2nd coat -Latex-Based Interior Eggshell Paint (FS TT-P-29).
3. 3rd coat - Latex-Based Interior Eggshell Paint (FS TT-P-29).

D. For drywall in **wet areas** (Operating Rooms, toilet rooms, shower rooms, lockerrooms, housekeeping closets, janitor closets, etc.) Gypsum: Odorless Semigloss Alkyd Enamel Finish (3 coats with total dry film thickness not less than 2.5 mils.)

1. 1st coat - Latex Bsed Interior White Primer (FS TT-650)
   Sherwin Williams B28W400
2. 2nd coat - Interior Semigloss Odorless Alkyd Enamel (FS TT-E-509).
3. 3rd coat - Interior Semigloss Odorless Alkyd Enamel (FS TT-E-509).

E. Ferrous Metal:
1. 1st coat - Red lead primer
   Devoe #41821
   Sherwin Williams Kem Kromik B50N2 or B50W1
2. 2nd coat - Semi-Gloss alkyd enamel
   Devoe #509XX
   Sherwin Williams B34W400 Series
3. 3rd coat - Semi-gloss enamel
   Devoe 509XX
   Sherwin Williams B34W400 Series
4. First coat not required on items that are shop printed.
5. For zinc coated surfaces, substitute zinc dust - zinc oxide primer Devoe #41839; Sherwin Williams Galvite B50W3 in lieu of red lead pigmented primer.
6. In mechanical equipment rooms and uninhabited shafts, ducts, hangers, piping, etc., not required to be painted except apply prime coat only to unprimed and uncoated ferrous metals.

F. Exposed hardwood: (Stained)
1. 1st Coat - Minwax
2. 2nd Coat - Glidden 5035 Sealer; S-W Pro Mar Varnish Sanding Sealer (B26V3).
3. 3rd & 4th Coats- Glidden Y-82 Varnish; S-W Oil Base Varnish (A66 Series).

G. Exposed wood and wood on interior of cabinets and drawers exposed when doors and drawers are opened:
1. 1st coat - Enamel undercoat
   Devoe #8801
   Sherwin Williams B49W200
2. 2nd coat - Semi-gloss enamel
   Devoe #509XX
   Sherwin Williams B34W400 Series
3. 3rd coat - Semi-gloss enamel
   Devoe #509XX

PART 3 - EXECUTION

3.01 INSPECTION

A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.

B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.02 SURFACE PREPARATION

A. General:
   1. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate conditions.
   2. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

B. Cementitious Materials:
   1. Prepare cementitious surfaces to be painted by removing efflorescene, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
   2. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

C. Wood:
   1. Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
   2. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
   3. When transparent finish is required, use spar varnish for backpriming.
   4. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

D. Ferrous Metals:
   1. Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
   2. Touch-up shop-applied prime coats wherever damaged or bare. Clean and touch-up with same type shop primer.

E. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.

3.03 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.

C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.04 APPLICATION

A. General:
   1. Apply paint in accordance with manufacturer's directions.
   2. Application: Plaster, concrete masonry and gypsum board - Brush or roller at Contractor's option.
   3. All other - brush only.
   4. Apply additional coats when undercoats, stains or other conditions shown through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   5. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
   6. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
   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 same as exterior faces, unless otherwise indicated.
   9. Sand lightly between each succeeding enamel or varnish coat.
   10. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

B. Scheduling Painting:
   1. Apply first coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   2. Allow sufficient time between successive coating to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

3.05 FIELD QUALITY CONTROL

A. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting:
   1. Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
   2. Testing laboratory will perform appropriate tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated

weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantative materials analysis.

3. If test results shown that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified plant, the two coatings are non-compatible.

3.06 CLEAN-UP AND PROTECTION

A. Clean Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect/ Engineer.

C. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

D. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION

SECTION 10210
METAL WALL LOUVERS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Louvers and frames with bird and insect screening and any blank out sheeting required for the application.

1.02 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01300.

B. Indicate on shop drawings, layout, elevations, dimensions, and tolerances; head, jamb, and sill details; blade configuration; screening; and frames.

C. Provide product data on preassembled louvers describing design characteristics, maximum recommended air velocity, free area, materials, and finishes.

D. Submit samples under provisions of Section 01300.

E. Submit two samples 2 x 4 inch in size illustrating finish and color of exterior and interior

F. Submit manufacturer's installation instructions under provisions of Section 01300.

1.03 COORDINATION

A. Coordinate work of this Section with installation of masonry flashings.

B. Coordinate work of this Section with mechanical ductwork.

PART 2 - PRODUCTS

2.01 ACCEPTABLE Manufacturers

A. Airolite, Type CB609 weatherproof, extruded aluminum louver (4" depth)

B. Equal products Construction Specialties or Arrow

C. Substitutions: Section 01600 - Material and Equipment and Instructions to Bidders.

2.02 MATERIALS

A. Aluminum: Aluminum alloy 6063-T52 extruded shape. Louvers shall be finished after assembly baked enamel finish meeting AAMA2603. Color to be selected to match wall finish.

2.03 ACCESSORIES

A. Bird Screen: Interwoven wire mesh of aluminum, 0.063 inch diameter wire, 1/2 inch open weave, square design.

B. Insect Screen: 18 x 16 size aluminum mesh, set in aluminum frame.

C. Sealants: Type specified in Section 07900.

2.04 FABRICATION

A. Louver Size: As indicated on drawings.

B. Louver Blade: Sloped at 63 Degree; horizontal V shape; minimum material thickness of 12 gage.

C. Louver Frame: Channel shape, welded corner joints, material thickness of 12 gage minimum.

2.05 FINISHES

A. Exterior and interior aluminum surfaces, screens: Factory baked enamel color to be selected.

B. Interior Aluminum Surfaces, Screens, and Blank Out Sheeting: clear aluminum.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that prepared openings and flashings are ready to receive work and opening dimensions are as indicated on drawings.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Secure louvers in opening framing with concealed fasteners.

D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

E. Install bird and insect screening to exterior and interior of louver.

F. Install insect screens to intake louvers. Install bird screens to exhaust louvers.

G. Install perimeter sealant and backing rod in accordance with Section 07900.

END OF SECTION

SECTION 10443

INTERIOR SIGNS
Aluminum Extrusion Sign with Changeable Insert – AC Series

1. GENERAL

1.1 SUMMARY

A. Related Documents: Provisions established within the General and Supplementary Conditions of the Contract, Division 1 - General Requirements and the Drawings are collectively applicable to this Section.

B. Section Includes:

1. Interior sign of aluminum, ADA Inserts, acrylic, and ABS plastic construction with arched face.

1.2 QUALITY ASSURANCE

A. Supplier: Obtain products in ALL Signage Sections from a single supplier.

B. Regulatory Requirements: Products shall meet requirements of the Americans With Disabilities Act Accessibility Guidelines (ADAAG) and local amendments and modifications.

C. Installer: Installation shall be performed by installer specialized and experienced in work similar to that required for this project.

D. Sign manufacturer to supply an Online Reorder Website for future orders by OLOL. Online Website to show each sign type with sign type drawings and prices. Website must have sign parts and complete sign descriptions. Website to have password access by multiple users.

1.3 SUBMITTALS

A. Submit in accordance with requirements of Division 1.

B. Product Data: Submit product data for specified products. Include material details for each sign specified.

C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including dimensions, anchorage, and accessories.

D. Samples: Submit supplier’s standard color chart for selection purposes and selected colors for verification purposes.

E. Installation: Submit supplier’s installation instructions.

F. Closeout Submittals:

1. Submit operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods.
2. Submit warranty documents specified herein.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Division 1.

1. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
2. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
3. Store products protected from weather, temperature, and other harmful conditions as recommended by supplier.
4. Handle products in accordance with manufacturer's instructions.

1.5 WARRANTY

A. Project Warranty: Comply with requirements of Division 1.

B. Manufacturer's Warranty: Submit manufacturer's standard warranty document executed by authorized company official.

1. Warranty Period: One (1) year from product ship date.

2. PRODUCTS

2.1 SIGNAGE SYSTEMS

A. Acceptable Manufacturers:
   1. Lettermans, 4726 Government St., Baton Rouge, LA. 70806; (225) 925-2663 telephone. Contact: Jason Wendt (225) 268-2436.
   2. Substitutions: Submit in accordance with Section 01600

B. VC Series Interior Wall-Mounted Exit Signs – Sign Type 1.0
   1. Arched face anodized aluminum frame size: 4” (height) x 5.9" (width)
   2. Clear Anodized Aluminum Vertical Caps. Gray Plastic Horizontal Caps.
   3. Inserts: 4”x5.75”h ADA inserts. Material: Provide tactile copy and Grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s Romark Acrylic Raster Braille ADA process. Sign face of (.040 total thickness). Standard Romark Silver integral background color. Painted backgrounds, photopolymer, sandblasted or applied decals are not acceptable.
   4. Integrally colored black text.
   5. Wall Mounting: VHB tape and silicone or mechanically fasten with bracket mounting.
   6. Quantity: See drawings

C. VC Series Interior Wall-Mounted Room Signs – Sign Type 1.1
   1. Arched face anodized aluminum frame size: 4” (height) x 7.87" (width)
   2. Clear Anodized Aluminum Vertical Caps. Gray Plastic Horizontal Caps
   3. Inserts: 4”x7.75” ADA inserts. Material: Provide tactile copy and Grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s Romark Acrylic Raster Braille ADA process. Sign face of (.040 total thickness). Standard Romark Silver integral background color. Painted backgrounds, photopolymer, sandblasted or applied decals are not acceptable.
   4. Integrally colored black text.
   5. Wall Mounting: VHB tape and silicone or mechanically fasten with bracket mounting.
   6. Quantity: See drawings.

D. VC Series Interior Wall-Mounted Restroom Signs – Sign Type 2.0
   1. Arched face anodized aluminum frame size: 8.1575” (height) x 7.87" (width) with 0.1575” gray plastic divider strip
   2. Clear Anodized Aluminum Vertical Caps. Gray Plastic Horizontal Caps
   3. Inserts: 6”x7.75” ADA inserts. Material: Provide tactile copy and Grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s Romark Acrylic Raster Braille ADA process. Sign face of (.040 total thickness). Standard Romark Silver integral background color. Painted backgrounds, photopolymer, sandblasted or applied decals are not acceptable.
   4. Integrally colored black text.
   5. Wall Mounting: VHB tape and silicone or mechanically fasten with bracket mounting.
   6. Quantity: See drawings.

E. **VC Series Interior Wall-Mounted Office ID Insert Area – Sign Type 3.**
   1. Arched face anodized aluminum frame size: 6.1575” (height) x 7.87" (width) with 0.1575” gray plastic divider strip
   2. Clear Anodized Aluminum Vertical Caps. Gray Plastic Horizontal Caps
   3. Inserts: 6”x7.75” ADA inserts. Material: Provide tactile copy and Grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s Romark Acrylic Raster Braille ADA process. Sign face of (.040 total thickness). Standard Romark Silver integral background color. Painted backgrounds, photopolymer, sandblasted or applied decals are not acceptable.
   4. Integrally colored black text.
   5. Sign to have 2”h x .020” thick Clear Lens with Matte Finish.
   6. Wall Mounting: VHB tape and silicone or mechanically fasten with bracket mounting.
   7. Quantity: See drawings.

F. VC Series Interior Wall-Mounted Suite ID – Sign Type 9.0
   1. Arched face anodized aluminum frame size: 10.1575” (height) x 11.81" (width) with 0.1575” gray plastic divider strip

2. Clear Anodized Aluminum Vertical Caps. Gray Plastic Horizontal Caps
3. Inserts: 2”x11.69” ADA inserts. Material: Provide tactile copy and Grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s Romark Acrylic Raster Braille ADA process. Sign face of (.040 total thickness). Standard Romark Silver integral background color. Painted backgrounds, photopolymer, sandblasted or applied decals are not acceptable.
4. Integrally colored black text.
5. Sign to have 8”h x 11.69” .020” thick Clear Lens with Matte Finish.
6. Wall Mounting: VHB tape and silicone or mechanically fasten with bracket mounting.
7. Quantity: See drawings.

2.2 SIGNAGE MATERIALS / COMPONENTS

A. Materials and Components:
   1. Aluminum Frames: Extruded aluminum, AA 6063
   2. Anodize - Properties (Alubin) IS 4402 part 2
   3. Acrylic Covers / Properties (Palram) Excellent weather resistance and long stability against UV degradation
   4. PETG Covers / Properties (Palram) High impact resistance UV protective layer / weather resistant Face Components:
      a) ADA-Ready Panels: .040" Aluminum-based photopolymer tactile and Braille characters with high temperature cured polyester color coating.
      b) Graphic Panels: Thickness varies per application and material from .020" to .069".
   5. Supports, Fixtures, and End Caps: As required for a complete and finished installation.
B. Painted Surface Treatment Finish: Manufacturer's standard two-phase finishing process. Colors as selected from manufacturer's standard colors.
   1. Performed electro statically (One coat).
   2. Curing is done in a curing oven (180÷190ºC) per the powder manufacturer's specification. (Available upon request).
C. Powder Coated Finish:
   1. General: The standard powder coat finish consists of a Polyester Powder.
   2. Surface Preparation and Powder Coating: Chromate passivation per American Specification MIL-C-5541E
   3. Testing of the powder coating is performed per Israeli Standard 4402 part 2, that is based on British specification BS 6496:1984, including coating testing for weather conditions, which are tested to specification ASTM G 154-2006.

2.3 FABRICATION - GENERAL

A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
B. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.
C. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.
D. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.
E. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

3. Execution

3.1 EXAMINATION

A. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.

B. Scheduling of installation by Owner or it's representative implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer's acceptance of substrate and conditions.

3.2 INSTALLATION

A. Install product in accordance with supplier's instructions.
B. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance.
C. Install product level, plumb, and at heights indicated.
D. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.
E. Install signs within the following tolerances and in accordance with manufacturer's recommendations:

Interior Signs: Within 1/4 inch vertically and horizontally of intended location.

3.2 CLEANING, PROTECTION, AND REPAIR

A. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 5 feet.
B. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project in accordance with provisions in Division 1.

3.3 SIGN SCHEDULE

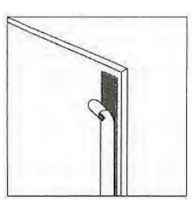
A. Schedule: Furnish & Install Six (6) **Type 3.0** Signs-Verbiage and Placement as directed by Architect.

END OF SECTION

10443-9

MOUNTING DETAIL

VHB Tape Mount



Office ID 3.0

WO#:

Orig. Date: 05-17--2021

Sales: Jason Wendt

Design: Katy Tye

Revision: #1

Machine: Router

Notes:

Approved By:

Approved Date:

LETTERMANS

4726 Government Street • Baton Rouge, LA 70806
225.925.2663 • www.lettermans.com

Baton Rouge • New Orleans • Lake Charles

SECTION 10523
FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included: Provide fire extinguishers and cabinets where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Provide (one) 5 lb ABC type extinguisher on wall hook at all mechanical and equipment rooms.

C. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section;
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
   3. Dimensioned drawings as needed to depict the space required for these items, and their interface with the work of other trades.
   4. Manufacturer's recommended installation procedures which, when approved by the Architect/Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.04 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01600.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. J. L. Industries

B. Larsen's Fire Protection and Safety Equipment

C. Muckle - Manufacturing Division of Technilo, Inc.

D. Amerex, Corp.

E. Kidde

2.02 DESCRIPTION

A. For the purpose of clarity and establishing type and quality items specified by manufacturer's model numbers and names below are based on products manufactured by Larsen's Manufacturing Company.

B. CABINETS
   1. Model - Occult Series Model-2409
   2. Door - Vertical Duo Door Style.
   3. Glazing - Clear double strength
   4. Color - Painted as selected by Architect.

C. FIRE EXTINGUISHERS
   1. MP10 (10 lbs ABC Type)

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Coordinate as required 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 original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect/Engineer, anchoring all components firmly into position for long life under hard use.

END OF SECTION

SECTION 12512
SHADES

PART 1 - GENERAL

1.01 Shades

A. The Contractor shall furnish and install shades at exterior windows and/or fixed glass openings for finished spaces.

B. **Furnish and Install shades as indicated on Drawings. (RE: Reflected Ceiling Plans)**

1.02 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's data clearly defining the required support and other details of installation to enable proper interface with the work of other trades.
4. Manufacturer's recommended installation procedures which, when approved by the Architect/Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.
5. Provide samples of manufacturer’s standard materials and colors for selection by Architect.

1.03 WARRANTY

A. Provide Standard 5 year manufacturer’s warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Provide Mechoshade, ThermoVeil, 0900 Series (0-1% Open),manual roller shades. Shade to be retractable and cover entire windows in rooms (from Ceiling to Sill and from jamb to jamb). Install per manufacturer’s printed instructions and recommendations.

B. Equals by Hunter Douglas approved for bidding.

C. Finish: Color shall be selected by Architect from manufacturers standard colors. Fabric: custom to fit each opening for all openings.

D. Operation: manual pull chain.

2.02 MATERIALS

A. Fabric shall be inherently anti-static, flame retardant, face and stain resistant, light filtering with an openess of 1%. Content shall be 75% PVC on polyester, 25% polyester and shall meet or exceed Federal FR specification NFPA 701 (small scale).

B. Control system to be adjustment-free continuous qualified #10 stainless steel ball chain and pulley clutch operating system to allow precise control and ensure a uniform lock. Clutch will develop no more than one half pound of drag for ease of lifting. Glass reinforced polyester for smooth, trouble free operation.

C. Roller to be circular shaped painted extruded aluminum tubes.

D. End Plugs to be heat stabilized fiber reinforced plastic outside sleeve and center shaft provid bearing surfaces on which the roller rides.

E. Bottom rod to be extruded aluminum weight in a sealed pocket hem bar for tracking adjustments and providing a uniform lock.

F. Mounting hardware to be manufacturers standard 0.07 nickel plated, C1008/1010 cold rolled steel universal brackets including end plug bracket with lock down retainer device.

G. Provide fascia cover in front of rollers where device is exposed.

PART 3 - EXECUTION

3.01 PREPARATION

A. Install in strict accordance with manufacturers printed instructions.

B. Verify all dimension in the field.

END OF SECTION

SECTION 13090
LEAD RADIATION SHIELDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Extent of X-Ray protective construction is indicated on Drawings.

B. This Section includes, but is not limited to, all X-Ray protective materials, devices and installation thereof, and all other related items necessary to complete this portion of the Project as indicated by Documents unless specifically excluded.

C. Refer to **Section 08712-Door Hardware**, for special door hardware for lead-lined doors.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Shop Drawings and Submittals: 01300.

B. Material and Equipment: 01600.

1.03 QUALITY ASSURANCE

A. Meet requirements and recommendations of applicable portions of Standards listed:
1. Louisiana Radiation Regulations.
2. NCRP Reports 49 and 51.

B. Perform post-installation testing as specified in PART 3 - EXECUTION and submit two copies of test reports to the Architect.

1.05 SUBMITTALS

A. Product Data:
1. Submit two copies of manufacturer's specifications and installation instructions for X-Ray protective construction and related items specified in this Section.
2. Include certified laboratory test reports on components where applicable.

B. Shop Drawings:
1. Furnish complete Shop Drawings for Architect's review prior to delivering materials to site.
2. Show all locations of lead protection and all applicable details. Indicate all methods of connecting, anchoring, fastening and bracing.
3. Note work by others which relates to lead protection work, giving special consideration to Mechanical and Electrical equipment, partition work and hardware.

C. Testing Results: Submit two copies of all testing results.

1.05 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 01600.

B. Deliver packaged materials and equipment items to site in manufacturer's original, unopened, labeled containers.

C. Arrange deliveries to provide sufficient quantities to permit continuity of erecting for any phase of work.

D. Evenly distribute heavy lead lined materials during storage to prevent damage to structure.

E. Handle lead protection items to avoid damage to protective materials and to in-place work.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Lead radiation shielding materials and manufactured items shall be products of one of the following:
   1. A & L Lead Company, Inc.; Rome, Georgia
   2. RRP: phone: 888-746-4777
   3. Ray-Bar Engineering Corporation: Azusa, Caifornia; phone 626-969-1818.

B. All others require Architect's written pre-bid approval in accordance with Instructions to Bidders and Section 01600.

2.02 BASIC MATERIALS

A. Lead Line Gypsum Board.
   1. Lead shall be 99.9% pure: As a standard of quality, **sheet of lead 1/16 inch thick shall weigh not less than four pounds per square foot.**
   2. Drywall panels, conforming to Federal Specifications SS-L30, Grade 3, Type X, Class 1, Form a, Style 3, shall be factory laminated with permanent, resilient adhesive to unpierced sheet lead, and arranged to provide effective lead insulation though all joints. Minimum height in rooms shall be 7'-0".
   3. Panels are secured to furring strips or metal studs with lead haded nails, or drywall screws with lead tabs. Lead laminated drywall panels shall be of specified thickness. (Provide equivalent to 4 lbs./ square foot unless noted otherwise.

B. Fasteners:
   1. Provide screws of type and size required and as recommended by lead protection manufacturer.
   2. Provide sheet lead washer to be folded over screw-head to complete protective barrier at all screw holes. Thickness of washer shall be the same as lead protection indicated for wall.

C. Glazing Material (At each X-ray room): Lead-barium glass with more than 60% heavy metal oxide content including at least 55% PbO. Both glass surfaces shall be polished. Light transmission shall be not less than 85% and lead equivalency shall be at least that required for the frame or door in which the glass is installed. Hollow metal frame shall have equivalent shielding.

2.03 LEAD-LINED PRESSED METAL FRAMES

A. Manufacturer's Designation:
   1. A & L Lead: "Lead Lined Hollow Metal View Window" and "Lead Lined Hollow Metal Door Frames".
   2. RPP.: "Hollow Metal Lead Lined Frame" and "Lead Lined Hollow Metal Frames".
   3. Ray-Bar Engineering Corporation: "Hollow Metal Lead Lined Frame" and "Lead Lined Hollow Metal Frames".

B. Description:
   1. Frames shall be fabricated to dimensions and profiles indicated on the Drawings.
   2. Material: Cold rolled 16 ga. steel.
   3. Lead Lining: Sheet lead, thickness and arrangement **as indicated on the Drawings and**

as specified herein (4 lbs/ square foot minimum), shall be continuous, shall follow the contour of the frame, and shall be unpierced at hardware preparations and anchor locations unless equal shielding is provided by the hardware. Include lead lining at mullions.

4. Frames shall be in accordance with requirements in **08349 - Radiation Shielding Door and Frames** "Hollow Metal Doors and Frames" including materials, general requirements, hardware preparations and shop painting, as applicable.
5. Provide glazing material, accurately cut to size, thickness as Required, for field installation in lead-lined frames.

2.04 LEAD-LINED DOORS

A. Manufacturer's Designation:
   1. A & L Lead: "Lead Lined Wood Doors"
   2. RPP.: "Lead Lined Wood Door"
   3. Ray-Bar Engineering Corporation.

B. Description:
   1. Doors shall be fabricated to sized indicated. Provide view panels in doors where called for.
   2. Material: Particle-core or lumber-core as recommended by manufacturer for particular use. Provide matching stile and rails. Provide solid wood blocking for closing devices.
   3. Lead Lining: Sheet lead, thickness as indicated on the Drawings and as specified herein **(4 lbs/square foot minimum**), shall be continuous and secured in place within the door inner structure. Lead lining shall be unpierced by the hardware. Shielding in door shall extend across the full width and height of the door.
   4. Doors shall be in accordance with requirements in **Section 08210** for **Wood Doors** including materials, general requirements, hardware preparations and shop painting, as applicable, except that manufacturer's standard inner construction shall be furnished.
   5. Provide view panels with removable metal glazing beads and glazing material of the thickness required and size indicated. Arrange lead lining and glazing material to provide a continuous plane of shielding without interruptions.

PART 3 - EXECUTION

3.01 GENERAL

A. Install all lead shielding materials and items as recommended by the manufacturer and/or distributor.

B. Carry lead-protection in thickness required for wall protection behind and around al electrical and mechanical receptacles, boxes, fixtures and cabinets which are recessed into wall surface or which break integrity of lead protection.

3.02 INSTALLATION OF WALL SHIELDING

A. Mount lead wall shielding in such a manner that lead will not sag or cold flow under its own weight.

B. Install per manufacturer's printed instructions.

C. Provide overlap of shielding at door and window frames.

D. Cover holes in the protective barriers so that overall attenuation is not impaired.

E. Provide necessary baffles at holes in barriers for pipes, conduits, and service boxes to ensure that the overall protection afforded by the barrier is not impaired.

3.03 INSTALLING FRAMES, DOORS AND GLAZING

A. Install frames and doors as specified in **Section 08113**, plumb, true and level. Build-in frames as masonry is erected; ensure that wall shielding and lead-lining of frames is overlapped; frames shall be grouted solid.

B. Install glazing material in accordance with Section 08800, using setting blocks and shims.

3.04 INSTALLING WORK SPECIFIED ELSEWHERE

A. Install equipment and other items indicated to be applied over lead shielding construction in a manner to preclude damage or penetration to lead barrier.

B. Where bolting or screwing through lead barrier is necessary or unavoidable, use only blots or screws for attaching which are lead shielded by lead washers and are of type recommended by lead shielding manufacturer.

3.05 CLEANING AND COMPLETION

A. Remove soil, stain and extraneous materials caused by installing lead shielding items from adjacent surfaces. Remove excess materials from site of work.

B. Repair or remove and replace damaged defective items. Immediately after installation remove rust, sand smooth, clean and touch-up areas where shop primer has been damaged. Glass shall be unbroken, clean, and free from scratches and rattles.

3.06 TESTING

A. After lead radiation shielding construction and equipment has been installed and placed in operating condition, the shielding shall be tested by a registered X-Ray physicist, certified by the American Board of Radiology, to verify continuity and adequacy of the shielding.

B. Remove and replace all radiation shielding construction and equipment which does not meet testing requirements.

END OF SECTION

SECTION 15010 – GENERAL PROVISIONS

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

C. Separation of Division into sections is for convenience only and is not intended to establish limits of work.

1.02 SUMMARY

A. Basic and supplemental requirements common to Fire Suppression, Plumbing and HVAC Work.

B. Perform all work under this heading, including the furnishing of labor, materials, equipment, and service necessary for and reasonably incidental to the proper completion of all mechanical work as shown on the drawings and herein specified.

C. Visit and examine the job and confer with all authorities concerned in order to become familiar with all existing conditions pertinent to the work to be performed. No additional compensation will be allowed for failure to be so informed.

D. Materials and equipment shall be new, except where otherwise indicated, of the best quality, with same brand or manufacturer for all similar material.

E. Perform all work in a neat and workmanship manner.

F. In general, provide the installation of plumbing systems, fire protection and heating, air conditioning and ventilating systems complete with piping, fittings, fixtures, equipment, etc.

G. Regardless of titles and subdivisions herein employed, consider these specifications as an complete document with General Sections applying to all other sections. All bidders are cautioned to read entire specifications and to thoroughly familiarize themselves with all requirements thereto.

H. Check all specifications and all drawings and bring to attention any conflicts or variations as soon as noted.

I. Specifications and accompanying drawings apply to all contracts or sub-contracts entered into for supplying material or labor for construction of work specified herein and shown on the drawings.

J. Division of Work: In accordance with the general conditions, contractor is responsible for dividing the work among the subcontractors and suppliers and for delineating the work to be performed by specific trades. Any mention of mechanical, sprinkler and/or plumbing contractor, control and/or electrical contractor are suggestions as to how the work may be divided. This is not a complete list of all the work. It is the contractor's responsibility that a complete and entire system is to be installed.

K. The term Contractor refers collectively to the general contractor and his subcontractors, and does not distinguish between the parties. The General or Prime contractor is solely responsible to the Owner for coordinating all work between different trades. Any required work not included in subcontractor's contract will be performed at the General or Prime Contractor's expense.

L. All work shall be performed in accordance with the International Building Code, International Plumbing Code 2015 Edition, NFPA and all local and jurisdiction codes. Miscellaneous construction materials required to meet code requirements shall be furnished and installed by the Contractor at the Contractor's expense regardless of whether or not such items are specifically detailed on the Contract drawings. The Contract Drawings are schematic in nature and are not intended to show every detail or component required for a complete working system and complete Code conformance.

M. Where there is a conflict between information shown on contract drawings, specifications Code requirements or industry standards, etc., the strictest and most conservative interpretation shall govern. In the event of a discrepancy between new and existing materials, Contractor shall assume the material to be new. If any item is indicated to be new any place on the drawings or in the specifications, the item in question shall be include in the Contractor's bid as new equipment or material.

N. Contractor shall not furnish, install, or utilize any equipment, products, or product components that contain any amount of asbestos material in any form.

O. The Architect will have the authority to order minor changes in the work not involving an adjustment in the Contract Sum or the Contract Time and not inconsistent with the intent of the Contract Documents in accordance with AIA Document A201-1976.

P. Coordination with electrical: Contractor to submit copy of any & all shop drawings that indicate electrical requirements to the project electrical engineer for electrical service & electrical load verification. Applicable to all mechanical items.

Q. All materials for new work shall be new and not used.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the Contract Documents.

1.04 DEFINITIONS

A. These definitions are included to clarify the direction and intention of these Specifications. For further clarification, contact the Architect/Engineer.

1. Concealed / Exposed: "Concealed" areas are those areas that cannot be seen by the building occupants. "Exposed" areas are all areas, which are exposed to view by the building occupants, including under counters, inside cabinets and closets, plus all mechanical rooms. “Exterior” areas are those that are outside the building exterior envelope and exposed to the outdoors.

2. Furnish: The term "furnish" is used to mean "supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

3. Install: The term "install" is used to describe operations at Project Site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

4. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use.

1.05 QUALITY ASSURANCE

A. Fire Suppression, Plumbing and HVAC systems shall be coordinated with other systems and trades to include but not be limited to: Electrical systems, fire alarm, security systems, transport systems, telephone and data systems.

B. Verification of Dimensions: The Contractor shall be responsible for the coordination and proper relation of Contractor’s Work to the building structure and to the Work of all trades. The Contractor shall visit the premises and become thoroughly familiar with all details of the Work and working conditions, to verify all dimensions in the field, and to advise the Architect/Engineer of any discrepancy before performing any Work. Adjustments to the Work required in order to facilitate a coordinated installation shall be made at no additional cost to the Owner or the Architect/Engineer.

C. All dimensional information related to new structures shall be taken from the appropriate Drawings. All dimensional information related to existing facilities shall be taken from actual measurements made by the Contractor on the Site.

D. The Drawings are subject to the requirements of Reference Standards, structural and architectural conditions. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of Work. Work shall be organized and laid out so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless specifically noted to be exposed. All exposed Work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.

E. When the Drawings do not give exact details as to the elevation of pipe and ducts, the Contractor shall physically arrange the systems to fit in the space available at the elevations intended with proper grades for the functioning of the system involved. Piping and duct systems are generally intended to be installed true and square to the building construction, and located as high as possible against the structure in a neat and workmanlike manner. The Drawings do not show all required offsets, control lines, pilot lines and other location details. Work shall be concealed in all finished areas.

F. Where core drilling of floor or wall penetrations is required, Work shall be performed in accordance with Division 03 Specifications. Where applicable Division 03 Specifications are not included in the Project, core drilling shall be in accordance with generally accepted standards, and be performed by licensed personnel where applicable.

G. Certify in writing that neither the Contractor nor any of Contractor's subcontractors or suppliers will supply any materials that contain any asbestos in any form for this Project.

1.06 DELIVERY, STORAGE AND HANDLING

A. All equipment, ductwork, and materials shall be delivered to the Project Site clean and sealed for protection.

B. Take particular care not to damage the existing construction in performing Work. All finished floors, step treads and finished surfaces shall be covered to prevent any damage by workers or their tools and equipment during the construction of the Project.

C. Equipment and materials shall be protected from rust and dust/debris both before and after installation. Any equipment or materials found in a rusty condition at the time of final inspection must be cleaned of rust and repainted as specified elsewhere in these Specifications.

D. All material affected by weather shall be covered and protected to keep the material free from damage while material is being transported to the Site and while stored at the Project Site.

E. During the execution of the Work, open ends of all piping and conduit, and all openings in equipment shall be closed when Work is not in progress, and shall be capped and sealed prior to completion of final connections, so as to prevent the entrance of foreign matter.

F. All equipment shall be protected during the execution of the Work. All ductwork and equipment shall be sealed with heavy plastic and tape to prevent build-up of dust and debris.

G. All ductwork and air handling equipment shall be wiped down with a damp cloth immediately before installation to ensure complete removal of accumulated dusts and foreign matter.

H. All plumbing fixtures shall be protected and covered to prohibit usage. All drains shall be covered until placed in service to prevent the entrance of foreign matter.

1.07 SUBMITTALS

A. Shop Drawings and Submittal Data Required

1. Submit to the Architect for review, immediately after award of contract, six (6) copies of complete descriptive information and dimensional data on all items of equipment, materials and accessories. Submit all shop drawings at one time. Piece meal submission shall not be acceptable.

2. Shop drawings and submittal data shall be considered to be instruments to service only and submitted for the sole purpose of convenience to the Contractor to assist him in the performance of the contract. The Architect's review of the shop drawings and submittal data shall not supersede these specifications, the accompanying drawings or the contract terms, unless specifically covered by a properly executed change order, and then only to the extent specifically and explicitly stipulated therein.

3. Coordination with electrical: Contractor to submit copy of any & all shop drawings that indicate electrical requirements to the project electrical engineer for electrical service & electrical load verification. Applicable to all mechanical items.

4. Any and all changes within to the contract documents in submittals shall be highlighted in yellow on the submittals (dimension, size, electrical requirements, material, color, etc.).

5. The contractor shall submit to the mechanical engineer, as soon as feasible after award of the contract, ductwork and equipment room layouts at a scale not less than 1/4" = 1'-0" showing the layout of the actual equipment to be used and all necessary clearances. This drawing is to comprehensive of all trades as to eliminate conflicts. The contractor will be responsible to verify all access for maintenance as required by the manufacturer.

6. Draw ductwork Shop Drawings on minimum 1/4 inch equal to one foot scale building floor plans and shall indicate piping and duct sizes, material, insulation type, locations of transverse joints, fittings, piping and ductwork bottom elevation, offsets, piping and ductwork specialties, expansion loops, anchors and other information required for coordination with other trades. Clearly designate the following on the Shop Drawings:

    a. Clearance dimensions between ducts and or location dimensions from walls, floors, columns, beams and large bore piping.

    b. Pipe and Duct materials i.e., steel, stainless steel, galvanized steel, prefabricated fire rated ductwork pressure class ratings of ducts as defined within this specification.

    c. Fire and fire/smoke partitions.

7. Coordinate with all other trades and building construction prior to submitting Shop Drawings for review. Indicate location of all supply, return, exhaust, and light fixtures from approved reflected ceiling plans on Shop Drawings.

B. Record Drawings

1. The contractor shall be furnished with one (1) set of blue line prints, on which Contractor shall show any changes in the work caused by unforeseen circumstances and these drawings shall be turned over to the Architect in good order prior to final acceptance of the building. Architect in turn shall prepare record drawings from information furnished by contractor.

C. Parts Catalogs and Operating Instructions

1. Furnish to the Architect for the Owner, three (3) complete sets of parts catalogs and operating instructions bound in large binders for his use. Each set shall contain:

   a. Complete wiring and control diagrams

   b. Routine maintenance operations

   c. Detailed operating instructions and instructions for making minor adjustments

   d. Manufacturer's catalog data, pump curves, service instructions, and part list of each piece of operating equipment

2. Instruct Owner's operator in the proper care, operation, lubrication, and maintenance of mechanical equipment installed.

D. Substitution

1. All material, equipment, methods and accessories entering into the work under this section of contract are subject to approval or disapproval of the Architect. Approval of any manufacture or vender, any material, or product, shall not constitute a waiver of Architect's right to demand full compliance with contract requirements, including shape, size, quality and performance.

2. Equality of materials is that established by opinion of Architect. Decision of Architect is final.

3. Whenever a material or article of equipment is specified by use of a proprietary name, or by naming the manufacturer or vendor, any material or article which will perform adequately the duties imposed by the design will be considered for substitution, providing it is of equal substance, and function, meets specifications, and is aesthetically acceptable to the Architect, and that requests for approval along with all literature and technical data on proposed substitution is submitted in writing so as to be received in Office of Architect not less than seven (7) calendar days prior to opening of bids.

4. Literature, technical data, etc., includes complete data (including catalog names and model numbers) and samples if necessary, with submissions for substitutions. Burden of proof that material offered for substitution is equal, or superior, in construction and efficiency to that named, rests on Contractor, and unless proof is satisfactory to Architect, substitutions will not be approved.

1.08 ADDITIONAL CLOSE-OUT DOCUMENT REQUIREMENTS

A. LEAD CONTENT CERTIFICATE: As part of the close-out documents, the contractor is to include a certificate stating that the lead content in the domestic water system complies with governing code and Health Department criteria. A test shall be made at each faucet, spigot, drinking fountain, and any other fixture drinking water may be obtained.

B. Contractor to provide a set of plans shows valve schedule & valve location on plans (full size set, 24"x36 plans). Plans to have valve type, manufacturer and model #. Also provide replacement part contact information for each valve.

C. Contractor shall provide a minimum three (3) sets of record documents of fire protection system including two (2) sets of electronic copies (pdf's) on disks. Contractor shall instruct designated owner personnel on system.

1.09 GUARANTEE AND SERVICE

A. Guarantee all equipment, materials and workmanship for a period of one (1) year following date of acceptance.

B. Guarantee all equipment with compressors a full five (5) years (material and labor for 1st year and labor and material (including refrigerant) for the next four (4) years).

C. During the period of guarantee and defects in equipment, materials or workmanship shall be promptly corrected without cost to Owner.

D. Guarantee includes equipment capacity and performance ratings specified with excessive noise levels. Any deficiencies in equipment capacity specified shall be promptly corrected.

E. Guarantee does not include normal maintenance items.

F. Guarantee water heater, boilers, and all pressure vessels for a full five (5) years.

G. Warranty period begins at date of substantial completion, not when contractor starts equipment. Figure in bid extending warranty to accomplish this.

1.10 FEES AND DEPOSITS

A. Arrange for and pay regulatory inspection and service connection fees (sewer, drainage, water and gas) including the cost of any main extensions. Pay meter deposits for utility services. After substantial completion of the project, the meter registration shall be transferred to the User/Owner.

1.11 VISITING SITE

A. The Bidder shall visit the site of proposed work so that he may understand the facilities, difficulties and restrictions attending the execution of the contract. No additional compensation will be allowed for failure to be so informed.

1.12 UTILITY CONNECTIONS

A. Coordination of utilities which are work of this contract to utilities installed as work of other divisions prior to starting any work. Verify connection points, inverts, valving, etc., prior to commencing any work. No additional compensation will be allowed for conflicts that occur due to lack of coordination.

1.13 NEW EQUIPMENT INSTALLATION

A. New equipment installed under this project specified by other section of these specifications which requires either mechanical or plumbing connections shall be installed by either the plumbing or mechanical sub-contractor. These connection points are based on the manufacturer specified and laid out by the architectural drawings. Should the contractor utilize another manufacturer, it is the contractor responsibility to verify all new connections (mechanical and electrical) and modify required services as necessary to place new piece of equipment into operation.

1.14 SPECIAL CONDITIONS

A. No piping, ducts or other mechanical equipment foreign to the electrical equipment shall pass through or above the spaces dedicated to electrical panel boards, electrical distribution panels, electrical switchboards and motor control centers. Work shall conform with NFPA 70. Working clearances and dedicated spaces at electrical equipment shall be maintained per NFPA 70. Coordinate with each trade.

1.15 INTERRUPTION OF SERVICES

A. Services in existing buildings are to be kept in operation during renovations, except when specific permission is given to do otherwise. Before any services are interrupted, arrangements shall be made with the User Agency to do this work at a time most convenient to the User Agency. This procedure may involve working at night, on Saturday or Sunday, or at a special time of the year, with the length of time of the interruption agreed upon in advance. Once any service is interrupted, work to restore the service shall be on a continuous basis unless temporary service is provided or approval is obtained from the User Agency to do otherwise. Temporary services indicated or required shall be provided as work of this Division. Allowance shall be made in the bid for the cost of any overtime incurred. Provide valves, caps, plugs, flanges, piping, etc. as required so that the existing utility can be placed back into service with provisions for the utility to be extended without an additional shutdown. Provide additional drains and vents in new and existing piping systems to minimize required shutdowns. Draining and filling piping systems after shutdowns have been completed shall be work of this Division.

1.16 DEMOLITION

A. Demolition work shall conform to the applicable requirements of DIVISION 1 - GENERAL REQUIREMENTS. Routings indicated for existing mechanical systems are approximate. Field verify existing conditions prior to ordering equipment or materials and make field adjustments as required.

B. Existing plumbing fixtures, equipment, piping and/or ductwork not being reused shall be disconnected and removed. Services serving the equipment being removed shall be removed back to the next piece of equipment which remains, or to the existing main or duct which remains, and shall be capped or plugged, unless otherwise noted on the drawings. Refer to architectural and mechanical drawings and specifications for more detailed requirements.

C. Care shall be taken in the removal of plumbing fixtures, equipment, piping and/or ductwork which the User Agency elects to retain. In the removal of existing plumbing fixtures, equipment, ductwork and/or piping, that portion of any system which remains shall continue to function.

1.17 EXISTING WORK

A. Exercise care in the installation of new work so as not to render any of the existing systems that are to remain inoperable. Should the installation of new plumbing fixtures, equipment, piping and/or ductwork require the temporary removal and reinstallation or modification and relocation of existing fixtures, equipment, piping and/or ductwork, the cost shall be included as work of this division and no additional compensation will be allowed.

B. Where existing piping or duct systems are indicated to be re-used, it is not possible to guarantee that the existing systems are completely suitable to be re-used. Before the systems are placed into service, a thorough check shall be made of existing equipment, piping systems, ductwork, etc., that will not allow new or existing equipment, piping or duct systems to operate properly and shall notify the Architect/Engineer or any deficiencies found. Submit a description of the proposed remedial work to correct any deficiencies along with a detailed cost estimate.

C. Provide piping adaptors (increaser/reducer) or duct transitions at point of each connection. Verify field conditions, dimensions and sizes of piping and ducts, etc., required for work of this Division to connect with existing work now in place. Any discrepancies between the Contract Documents and the existing conditions shall be referred to the Architect/Engineer prior to ordering materials or performing any work affected by these discrepancies.

D. When connecting to existing systems, field verify positions of supply and return piping before performing any work. The directional flow arrows and piping labels indicated on the drawings shall be confirmed before performing any work. Report any discrepancies to the Architect/Engineer before proceeding. When connection to any existing system field verify the service of the existing system before performing any work. When connecting to existing drainage (sewer, storm, drain, etc.) systems, field verify location, depth, size, slope and direction of flow prior to performing any work.

1.18 EXISTING EQUIPMENT AND MATERIALS

A. Mechanical equipment removed and not indicated to be re-used shall be stored in one location on the site. Any equipment or material which the User Agency does not designate to be retained shall become the property of the Contractor and shall be removed from the site by him.

1.19 WORK IN OTHER DIVISIONS

A. Prior to bidding, the Contractor shall coordinate items of work referred to as "**work of other Divisions"** to insure items are not omitted or duplicated.

1. Utility Connections - sewer, storm drainage and water unless otherwise noted on the drawings..

2. Electrical work (wiring, raceways and disconnect switches), fire alarm work (wiring, raceways, equipment and devices) associated with work of this division and not specified as work of Division 16 - Electrical, shall be work of this division.

3. Supports for work of this Division, except supports specifically indicated to be provided under other Divisions, shall be provided as work of this Division. Supports provided under other Divisions shall be checked and coordinated under this Division to ensure that they suit the work to be installed.

4. Painting, including painting of exposed insulation, exposed piping and exposed ductwork not specified as work of DIVISION 9 - FINISHES, shall be work of this Division. Damaged surfaces of factory finished items shall be repaired to the satisfaction of the Architect/Engineer as the work of this Division. Nameplates shall be protected until painting has been accomplished. Protection shall be removed and nameplates cleaned prior to acceptance of equipment.

1.20 MANUFACTURER'S RECOMMENDATIONS

Equipment and materials provided under this Division of the specifications shall be installed according to manufacturer's recommendations. Each manufacturer' application and installation instructions shall be reviewed prior to ordering equipment or commencing with the work. If the drawings or specifications show or describe any deviations from the manufacturer's recommendations the Contractor shall request clarification, from the Architect/Engineer and provide as directed at no additional cost to the User Agency.

PART 2 - PRODUCTS

2.01 GENERAL

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

D. All equipment installed shall have local representation, local factory authorized service, and a local stock of repair parts.

E. Responsibility for furnishing proper equipment and/or material and ensuring that equipment and/or material is installed as intended by the manufacturer, rests entirely upon the Contractor. Contractor shall request advice and supervisory assistance from the representative of specific manufacturers during the installation.

F. All materials, unless otherwise specified, shall be new, free from all defects, suitable for the intended use and of the best quality of their respective kinds. Materials and equipment shall be installed in accordance with the manufacturer's recommendations and the best standard practice for the type of Work involved. All Work shall be executed by mechanics skilled in their respective trades, and the installations shall provide a neat, precise appearance. Materials and/or equipment damaged in shipment or otherwise damaged prior to installation shall not be repaired at the job Site but shall be replaced with new materials and/or equipment.

G. Materials and equipment manufactured domestically are preferred when possible. Materials and equipment that are not available from a domestic manufacturer may be by a non-domestic manufacturer provided they fully comply with Contract Documents.

H. Prevention of Rust: Standard factory finish will be acceptable on equipment specified by model number; otherwise, surfaces of ferrous metal shall be given a rust inhibiting coating.

2.02 NAMEPLATES

A. Each major component of equipment shall have the manufacturer's name, address, and catalog number on a plate securely attached to the item of equipment. All data on nameplates shall be legible at the time of Final Inspection.

B. Nameplates shall be black laminated rigid phenolic with white core. Nameplate minimum size shall be 1 inch high by 3 inches long with 3/16-inch-high engraved white letters.

C. Nameplate Fasteners: Fasten nameplates to the front of equipment only by means of stainless steel self-tapping screws. Stick-ons or adhesives will not be allowed unless the NEMA enclosure rating is compromised, then only epoxy adhesive shall be used to attach nameplates.

D. Nameplate Information: In general, the following information is to be provided for the types of electrical components or enclosures supplied with equipment.

1. Individual Starters, Contactors, Disconnect Switches, and Similar Equipment: Identify the device, and voltage characteristics source and load served.

2.03 WALL, FLOOR AND CEILING PLATES (ESCUTCHEONS)

A. Except as otherwise noted, provide stainless steel or chrome plated brass floor and ceiling plates around all pipes, ducts, conduits, etc., passing exposed through walls, floors or ceilings, in any spaces except underfloor and plenum spaces.

B. Plates shall be sized to fit snugly against the outside of the pipe or against the insulation on lines that are insulated and positively secured to such pipe or insulation.

C. For finished ceiling installation, secure escutcheons to ceiling with escutcheon fasteners.

D. Plates will not be required for piping where pipe sleeves extend ¾-inch or more above finished floor.

E. Round and rectangular ducts shall have closure plates (not chrome plated) made to fit accurately at all floor, wall and ceiling penetrations.

2.04 ROOF PENETRATIONS AND FLASHING

A. Pipe, conduit and duct sleeves, pitch pockets and flashings compatible with the roofing installation shall be provided and installed for all roof penetrations by a contractor qualified in such Work. Installation shall comply with the Contract.

2.05 FLAME SPREAD PROPERTIES OF MATERIALS

A. All materials and adhesives used for acoustical linings, jackets and insulation shall comply with requirements of NFPA 90A and 90B and UL guide no. 40 V.8.15. Products exceeding a flame spread rating of 25, or a smoke developed rating of 50, as determined by ASTM Test Method E-84 are prohibited. Adhesives and sealers shall be fire retardant and fire resistant when dry. Flame proofing treatments which are subject to decomposition, deterioration, or the effects of moisture are prohibited.

2.06 SCAFFOLDING, RIGGING AND HOISTING

A. Each contractor shall furnish all scaffolding as required for the installation of his work. He shall either arrange with the General Contractor for servicing in connection with any rigging and hoisting required or provide his own equipment to hoist apparatus to be installed by him into place. Each contractor shall see that any equipment too large to permit passage through normal doorways and access ways is brought to the job and set in place before the mechanical spaces are enclosed. All apparatus not delivered in this manner shall be disassembled and reassembled in the proper location. Equipment specified to be factory assembled and tested prior to shipment shall not be disassembled for shipment to an installation into the building.

2.07 MATERIALS IN AIR DUCTS AND PLENUMS

A. No plastic or other non-metallic materials as defined by NFPA 90A shall be used in air ducts or plenums unless specifically rated for such service.

2.08 FIRE RATED WOOD

A. All wood as specified within these construction documents (mechanical, plumbing, sprinkler plans and specifications) shall be of the fire rated type. PYRO-GUARD treated wood as manufactured by HOOVER treated wood products.

2.09 CONCRETE FASTENERS

A. Fastenings set into concrete to support pipe, air handlers and other mechanical equipment shall be steel or malleable iron expansion shields set in proper size drilled holes. Do not exceed the manufacturer's rated pull out load. The manufacturer's rated load must be based on a factor of safety of 5 or else the allowable load must be reduced to give a factor of safety of 5. Self drilling Rawl Saber Tooth or Phillip Red Heads may be used. Anchors using lead, plastic or shields of any material other than steel or malleable iron shall not be used.

B. Powder actuated fasteners, Hilti or Ramset, may be used for loads applied with a factor of safety of 5 but not more than 300 pounds for the largest size. The powder charge shall be found by trial and shall be the smallest charge that gives full insertion into the concrete. These fasteners may be used for ductwork and small pipe.

C. Suitably located existing inserts which were cast into the concrete at the time of construction may be reused.

D. Follow manufacturer's instructions and use setting tools procured from the manufacturer of the drilled-in anchors to expand the shields.

E. Fasteners of the type set into concrete by drilling shall be self drilling Rawl Saber Tooth or Phillips Red Heads.

F. Powder actuated fasteners shall be Hilti or Ramset.

2.10 PREPARED OPENINGS

A. Piping and tubing installed through masonry or concrete walls, floor/ceiling assemblies and floors above grade shall be installed through pipe sleeves.

B. Duct installed through masonry or concrete walls and non-rated concrete floors above grade shall pass through 20-guage galvanized sheet metal sleeves. Duct sleeve shall have a ½" maximum annular clearance around duct. Allowances shall be made for external duct wrap (if specified). Ducts, tubing and piping installed through floors of mechanical rooms shall have a 4" high concrete curb on each side to prevent water from leaking through openings. Exposed piping installed through walls shall be fitted with chromium plated escutcheons on each side of the wall. Exposed ductwork passing through non-rated masonry or concrete walls shall be fitted with a 2" wide sheet metal flange around each side of duct on each side of the wall.

C. Ducts installed through partitions, walls or floors which are smoke rated or have a fire rating of one hour or greater shall be installed in accordance with SMACNA standards. Piping and tubing installed through partitions, walls or floors which are smoke rated or have a fire rating of one hour or greater shall be installed through pipe sleeves.

2.11 ROOF MOUNTED EQUIPMENT, DUCTS AND PIPING

A. Roof mounted equipment shall be installed on equipment supports or curbs as detailed on the drawings or as specified. Tops of curbs shall be level. Ducts penetrating the roof shall be installed within a waterproof curbed area as detailed on the drawings. Piping penetrating the roof shall be installed through a pitch pocket or piping curb as noted or detailed on the drawings. Any penetrations of the roof shall be watertight.

2.12 SAFING MATERIAL

A. Safing material shall be installed in annular spaces between sleeve and pipe or tubing where sleeve and pipe or tubing penetrate partitions that are designated as smoke separations. Material shall be mineral wood designed for hand packing. Material shall have an ASTM E 84 rating of flame spread -10, fuel contributed -0, smoke developed -0 and shall be rated non-combustible per ASTM E 136.

2.13 TAMPER PROOF FASTENERS

A. Where equipment is specified to have tamper proof or vandal proof fasteners, the Contractor shall coordinate and use the same type of fastener on each item. Provide User Agency with two wrenches, screw drivers, etc., for each type of fastener used on the project.

2.14 ENCLOSURES

A. Control equipment enclosures provided by the Contractor or provided as part of a packaged piece of equipment shall meet the following minimum standards unless specifically indicated otherwise. Where indicated on the drawings or specifications, flush mounted enclosures shall be provided.

B. Control equipment enclosure provided within the building shall be equivalent to or greater than NEMA 1 type construction. Control equipment enclosures provided outside of the building, a non-enclosed area of the building or in an accessible crawl space under a building shall be equivalent to or greater than NEMA 3R type construction with drain and breather. Control equipment enclosures provided within hazardous areas, controlling explosion-proof equipment shall be NEMA 7 or 9 type construction. Control equipment enclosures provided for cooling towers and associated equipment within 20’-0” of towers shall be NEMA 4X noncorrosive type construction.

2.15 SAFETY PANS

A. Safety pans shall be fabricated from 18-guage (min.) galvanized sheet steel. Sides of pans shall be a minimum of 4” high with top edges hemmed. Sides longer than 6’-0” shall have additional flat bar or angle top edge bracing to prevent sagging. Joints and seams shall be watertight. Pans shall be extended at least 6” beyond the sides of the equipment it is serving. Provide a 1” steel female pipe coupling in side of pan near the bottom of overflow piping connection.

PART 3 - EXECUTION

3.01 PREPARATION

A. Cooperate with trades of adjacent, related or affected materials or operations, and with trades performing continuations of this Work in order to effect timely and accurate placing of Work and to coordinate, in proper and correct sequence, the Work of such trades.

B. The size of equipment indicated on the Drawings is based on the dimensions of a particular manufacturer. While other manufacturers may be acceptable, it is the responsibility of the Contractor to determine that the equipment proposed will fit in the space. Fabrication Drawings shall be prepared when required by the Architect/Engineer or Owner to indicate a suitable arrangement.

C. All equipment shall be installed in a manner to permit access to all surfaces. All valves, motors, drives, filters, and other accessory items shall be installed in a position to allow removal for service without disassembly of another part.

D. Space Requirements:

1. Consider space limitations imposed by contiguous Work in location of equipment and material. Do not provide equipment or material which is not suitable in this respect.

2. Make changes in material and equipment locations of up to five (5) feet, to allow for field conditions prior to actual installation, and as directed by the Architect/Engineer at no additional cost to the Owner.

E. Contractor shall note that the electrical design and Drawings are based on the equipment scheduled and indicated on the Drawings. Should any equipment be provided requiring changes to the electrical design, the required electrical changes shall be made at no cost to the Owner.

F. Connections for equipment other than Divisions 15:

1. Rough-in and provide all gas, air, water, steam, sewer, etc. connections to all fixtures, equipment, machinery, etc., furnished by the Owner and/or other trades in accordance with detailed rough-in Drawings provided by the equipment suppliers, by actual measurements of the equipment connections, or as detailed.

2. After the equipment is set in place, make all final connections and provide all required pipe, fittings, valves, traps, etc.

3. Provide all backflow preventers and air gap fittings required, using approved devices. In each service line connected to an item of equipment or piece of machinery, provide a shutoff valve. On each drain not provided with a trap, provide a suitable trap.

4. Provide all ductwork, transition pieces, etc., required for a complete installation of vent hoods, fume hoods, etc.

3.02 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Piping may be run exposed in rooms typically without ceilings such as mechanical rooms, janitor's closets, tight against pan soffits in exposed "tee" structures, or storage spaces, but only where necessary. Shutoff and isolation valves shall be easily accessible.

D. All pipe, conduits, etc., shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All ducts, pipes and conduits run exposed in machinery and equipment rooms shall be installed parallel to the building lines, except that piping shall be sloped to obtain the proper pitch. Piping and ducts run in furred ceilings, etc., shall be similarly installed, except as otherwise shown. All pipe openings shall be kept closed until the systems are closed with final connections.

E. Prior to the installation of any ceiling material, gypsum, plaster or acoustical board, the Contractor shall notify Owner's Project Manager so that arrangement can be made for an inspection of the above-ceiling area about to be "sealed" off. The Contractor shall provide written notification to the Owner at least five (5) calendar days prior to the inspection.

F. Precedence of Materials:

1. The Specifications determine the nature and setting of materials and equipment. The Drawings establish quantities, dimensions and details.

2. If interference is encountered, the following installation precedence of materials shall guide the Contractor to determine which trade shall be given the "Right of Way":

a. Building lines

b. Structural members

c. Structural support frames supporting ceiling equipment

d. Electric tracked vehicle system

e. Soil and drain piping

f. Vent piping

g. Supply, return and outside air ductwork

h. Exhaust ductwork

i. HVAC water and steam piping

j. Condensate piping

k. Domestic water (cold and hot, softened, treated)

l. Refrigerant piping

m. Electrical conduit

3. Coordinate fire suppression, plumbing and HVAC systems with transport systems as required to maintain transport system right-of-way.

3.03 TESTING

A. When any piece of mechanical equipment is operable and it is to the advantage of the Contractor to operate the equipment, Contractor may do so, provided that Contractor properly supervises the operation, and has the Owner's written permission to do so. The warranty period shall, however, not commence until such time as the equipment is operated for the beneficial use of the Owner, or date of Substantial Completion, whichever occurs first.

B. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install clean filter media, properly adjust, and complete all deficiency list items before final acceptance by the Owner. The date of acceptance and performance certification will be the same date.

C. Before the Work is accepted, an authorized representative of the manufacturer of the installed materials and/or equipment shall personally inspect the installation and operation of manufacturer's materials and/or equipment to determine that materials and/or equipment are properly installed and in proper operating order. The qualifications of the manufacturer's representative shall be appropriate to the technical requirements of the installation. The qualifications of the manufacturer's representative shall be submitted to the Owner for approval. The decision of the Owner concerning the appropriateness of the manufacturer's representative shall be final. Testing and checking shall be accomplished during the course of the Work where required by Work being concealed, and at the completion of the Work.

D. Check inspections shall include piping, equipment, heating, air conditioning, insulation, ventilating equipment, controls, mechanical equipment and such other items hereinafter specified or specifically designated by the Architect/Engineer.

E. The Contractor shall execute, at no additional cost to the Owner, any tests required by the Owner or the National Fire Protection Association, ASTM, etc. Standards listed. The Contractor shall provide all equipment, materials and labor for making such tests. The Owner will pay reasonable amounts of fuel and electrical energy costs for system tests. Fuel and electrical energy costs for system adjustment and tests, which follow Substantial Completion by the Owner, will be borne by the Owner.

F. Notify the Owner's Project Manager and the Architect/Engineer in writing at least seven (7) calendar days prior to each test and prior to other Specification requirements requiring Owner and Architect/Engineer to observe and/or approve tests.

G. All tests shall have pertinent data logged by the Contractor at the time of testing. Data shall include date, time, personnel performing, observing and inspecting, description of the test and extent of system tested, test conditions, test results, specified results an other pertinent data. Data shall be delivered to the Architect/Engineer as specified under "Requirements for Final Acceptance." The Contractor or Contractor's authorized job superintendent shall legibly sign all Test Log entries.

H. Refer to Commissioning Specification Sections for additional Start-up, prefunctional and operational checkout, and for functional performance test procedures.

I. General: Concealed piping and duct work and insulated piping and ductwork shall be tested in place before concealing or covering. Piping and ductwork located underground shall be tested before backfilling. Equipment, materials, and instruments for testing shall be furnished by the contractor without additional cost to the owner. System components not rated for the respective test pressure shall be isolated from the system during the test.

1. Sanitary, Waste, and Vent System

    a. The hydrostatic test shall be performed before installing fixtures. Water tests shall be applied to each system(s) either in its entirety or in sections. If the test is applied to the entire system, all openings in the piping shall be closed except the highest opening, and the system shall be filled with water and tested with at least a 10ft. head of water. In testing successive sections, at least the upper 10 ft. of the next preceding section shall be tested so that each joint or pipe in the building except the uppermost 10 ft. of the system has been submitted to a test of at east a 10 ft. head of water. The water shall be kept in the system, or in the portion under test for at least 2 hours before the inspection starts. The system shall be tight at all joints.

    b. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.

    c. The final test of the completed drainage and vent system shall be visual and in sufficient detail to insure that the provisions of this section have been complied with. If in question the engineer shall require the plumbing undergo a smoke test. The smoke test shall be made by filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof (at furthest vent), they shall be closed and a pressure equivalent to a one inch water column shall be built and maintained for fifteen minutes before inspection starts.

2. Domestic Water Systems

a. The hydrostatic test shall be made upon completion of the roughing-in and before setting fixtures. The entire domestic cold water and hot water, and hot water circulation piping system shall be tested at a hydrostatic pressure of 200 psig and proved tight at this pressure for a period of not less than 2 hours in order to permit inspection of all joints. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately in a manner described for the entire system.

b. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.

3. Heating and Air Conditioning Piping System

a. Field erected refrigerant piping shall be tested with a halide leak detector.

b. No loss in pressure will be permitted. Leaks detected shall be repaired by tightening, rewelding joints, or replacing pipe and fittings. Caulking of joints will not be permitted.

c. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.

4. Air Distribution Systems

a. Refer to Section 15815 for required testing procedures.

b. Provide notice of test to engineer/architect for witness of test. Provide engineer/architect results of test in writing on contractor letterhead.

3.04 PAINTING

A. Factory painted equipment that has been scratched or marred shall be repainted to match original color.

B. Steel equipment hangers and supports, uninsulated black steel pipe, and black steel pipe supports exposed to sight outside the building which are not provided with factory prime coat shall be cleaned of rust, grease, and scale. After cleaning hangers, supports and pipe, a field-applied prime coat and two coats of a bituminous aluminum paint shall be provided. Insulated pipe outside the building shall be cleansed of rust, grease and scale, and shall be provided with a field-applied prime coat before installing insulation. Paint all exposed piping, insulation, grilles, fans, etc., in building or on roof, if not factory finished. Paint piping equipment, hangers, and accessories in all mechanical equipment rooms, including covering and foundations with two (2) coats of approved paint after thoroughly cleaning. Size insulation covering before painting. Equipment having factory finish, if damaged or scratched, shall be touched up and given one additional coat of machinery enamel.

C. If rooftop equipment is not painted grey, contractor to repaint all equipment grey (including, chillers, cooling tower, pumps, etc.).

D. All painting shall conform to the requirement of the PAINTING Section.

3.05 CLEANING AND ADJUSTING

A. All equipment, pipe, valves, and fittings shall be cleaned of grease, oil, paint spots, metal cuttings, sludge, and construction debris.

B. Ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing outlet faces.

C. Bearings shall be lubricated as recommended by the equipment manufacturer.

3.06 FILTERS

A. Construction Filters - Provide MERV 13 high efficiency filters, with rolled filter media clipped over return air grilles for course filtration. All filters to be replaced during construction as needed. Replace all filters after construction with an additional set to the owner.

B. Contractor to provide a complete list of permanent filters with the filter sizes, type, equipment being filtered and location of filter. Submit list to owner prior to substantial completion.

3.07 PENETRATION THROUGH FIRE SEPARATIONS

A. Pack annular space between sleeve and pipe (insulation) and / or conduit in rated construction with fire resistant putty, sealant and / or caulk. Material shall be non asbestos based and installed in Penetrations of multiple items and penetrations with annular space greater than ½" shall be provided with approved backing material in accordance with manufacturer's instructions in accordance with manufacturers instruction for fire rating required.

B. Penetrations of multiple items and penetrations with annular space greater than ½" shall be provided with approved backing material in accordance with manufacturer's instructions.

C. Fire retardant sealer and system shall meet ASTM E-84, ASTM E-814, and UL-1479.

3.08 FRICTION LOSSES, ELECTRICAL RATINGS AND SPACE REQUIREMENTS

A. The values of air and water friction losses, electrical current ratings and space requirements for various pieces of equipment, as contained in these specifications or as scheduled, are estimated values and sizes and have been used in obtaining specifications for equipment and for sizing ducts, pipe, electrical wiring and motor controls. Any necessary changes in any of these items resulting from values other than the estimated ones shown shall be the responsibility of the Contractor and shall be subject to the approval of the Architect/Engineer. The Contractor shall pay any costs for additional labor and material required including costs of any other Contractor involved. Should substitute equipment require different requirements from that shown on the drawings, the Contractor shall be responsible for the cost of the changes. Any such changes must be approved by the Architect/Engineer.

3.09 CHANGES TO PIPING OR DUCTS

A. Should the Contractor desire to make changes in the routing or arrangement of piping or ducts, whether for his own convenience, to avoid conflict with the work of other trades, or to conform to local codes, such changes shall not be made without the prior approval of the Architect/Engineer.

3.10 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

B. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.

C. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.

D. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

E. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

F. I Install anchor bolts according to anchor-bolt manufacturer's written instructions.

G. Install anchor bolts to elevations required for proper attachment to supported equipment.

H. Use 3000-psi, 28-day compressive-strength concrete and reinforcement.

3.11 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Clean surfaces that will come into contact with grout.

B. Provide forms as required for placement of grout.

C. Avoid air entrapment during placement of grout.

D. Place grout, completely filling equipment bases.

E. Place grout on concrete bases and provide smooth bearing surface for equipment.

F. Place grout around anchors.

G. Cure placed grout.

3.12 TROUBLESHOOTING

A. By Contractor: If, during the start-up or warranty period, mechanical systems operational problems occur for which the root cause is not readily apparent, Contractor shall promptly, through a Subcontractor or other resource designated by Subcontractor, provide diagnostic and investigative services to determine the cause or causes.

B. By Engineer:

1. At Contractor's request, Engineer will provide the services necessary to determine the cause or causes of the operational problems.

2. Under the provisions of the General Conditions, Engineer will also provide these services if Contractor fails to respond satisfactorily to operational problems within a reasonable time after written notice from Engineer.

3.13 TRAINING

A. Operating and Maintenance Manuals and instruction shall be provided as specified under the Division 01 Section entitled “Project Closeout Procedures.”

B. Specific training and operating instructions for individual equipment components shall be as specified in the individual Specification Sections. In addition to all training specified herein, the contractor shall provide the additional training services to the owner:

1. Training on mechanical and associated systems will be provided by vendors in multiple sessions spread throughout the warranty period as specified herein.

2. Initial training at the end of construction will cover basic maintenance and operation along with basic design and installation of the equipment and systems. This training will be used by the owner to assist the contractor in maintaining equipment during the warranty phase. Allow at least 2 hours for each system. Total training to be at least 24 hours due to the owner.

3. The vendors will then supply brief refresher training at approximately 6 months from the date of substantial completion if requested by Owner. Allow at least 2 hours for each system.

4. All training to be video taped and supplied to owner & architect/engineer on DVD format.

3.14 ELECTRICAL WORK

A. Refer to schedules and electrical drawings for motor voltages. Motors for mechanical equipment shall be provided under this division. The work of this division shall include setting and aligning integral drive motors in operating position. Unless noted otherwise, variable speed drives, combination magnetic starters and, magnetic motor starters for mechanical equipment shall be provided under this division and installed and electrically connection under DIVISION 16 - ELECTRICAL.

B. Electrical work in connection with DIVISION 15 - MECHANICAL required but not indicated as work of DIVISION 16 - ELECTRICAL shall be work of this Division. Control disconnects, monitoring, level, electrical interlock and signaling wiring and raceways shall be work of this Division. Safety, signaling and control devices such as thermostats, firestats, damper motors, valve operators, push buttons, pilot lights, control and/or monitoring panels, crank-case heaters, etc., shall be provided and wired under this Division in strict accordance with an approved wiring diagram. Wiring and raceways installed under this Division shall comply with the requirements of DIVISION 16 - ELECTRICAL and shall be installed by a license electrician.

3.15 WORK RELATED TO EQUIPMENT NOT FURNISHED AS WORK OF THIS DIVISION

A. Unless specifically indicated otherwise, any required mechanical services for and required mechanical connections to items indicated on the drawings or in the specifications or items provided by User Agency shall be mechanically connected as work of this Division. The Contractor shall provide piping, valves, traps, etc., as required for complete operation of each piece of equipment.

3.16 OPERATING INSTRUCTIONS

A. Prior to the time scheduled for occupancy, the Contractor shall provide the services of a competent mechanic to instruct the User Agency in the care and operation of equipment. Before final acceptance, the Contractor shall prepare and deliver to the Architect/Engineer three bound copies of operating instructions, which shall be contained in a hard back loose lease type binders, divided into a suitable number of volumes so as to permit easy reference and shall include:

1. Description of major components of systems, including the function of major items.

2. Detailed operating instructions and instructions for making routine minor adjustments.

3. Routine maintenance operations.

4. Manufacturer’s catalog data, service instructions wiring diagrams, fabrication drawings and parts list for each piece of operating equipment.

5. Copies of equipment submittals and shop drawings, including review sheet, reviewed by and acceptable to the Architect/Engineer.

6. Guarantee and Warranty Information.

7. Names and telephone numbers of subcontractors and suppliers.

3.17 EQUPMENT SUPPORTS

A. Unless otherwise specified, supports necessary for properly supporting the work and the equipment of this Division shall be provided under this Division. Additionally, provide isolation materials to prevent transmission of vibration to the building structure. Isolation of equipment as shown on drawings or specified is the minimum required, and any additional isolation required to prevent transmission of vibrations shall be provided under this Division, in accordance with the equipment manufacturer's recommendations. Foundations for supports shall be provided under DIVISION 3 - CONCRETE or DIVISION 5 - METALS.

3.18 DISSIMILAR METALS

A. Inert NSF/FDA lines dielectric nipples shall be provided between copper, bronze or brass piping material or valves and steel piping material or steel tanks. Dielectric nipples and brass or copper unions or flanges shall be provided at cast iron valves and equipment where hereinbefore specified for equipment maintenance. Dissimilar metals shall be isolated from surface contact with Each other by the use of a non-conductive material, tape, etc.

3.19 OPENINGS, GROUNDS AND CHASES

A. Openings, grounds, chases and lintels will be provided under other Divisions, as directed by this Division, to accommodate the piping, ductwork and equipment. Sleeves and prepared openings shall be accurately located in slabs or walls before pouring of concrete. It shall be the responsibility of this Division to verify that openings and chases are properly located. Openings associated with work of this Division. Coordinate location of grease ducts through roof and arrange for roof framing to be relocated to avoid offsetting of ducts.

B. Holes through existing concrete shall be either core drilled or saw cut. Drilled or cut holes required shall have the approval of the Architect/Engineer prior to cutting or drilling. Sleeves set in openings cut in existing masonry or concrete walls or concrete slabs shall be one pipe size smaller in outside diameter than the cored hole. The sleeve shall be grouted in place with non-shrinking waterproof grout. Where piping is installed through smoke and/or fire separations, fill annular space between sleeve and piping with safing or fire barrier material.

3.20 ACCESS DOORS

A. Equipment which may require constant or periodic operation or adjustment such as bun not limited to valves, water hammer arresters, cleanouts, automatic smoke and fire dampers, damper operators, mixing boxes, variable volume equipment, steam traps, plumbing traps, plumbing fixture connections, etc., located in or above inaccessible ceilings, walls, or chases shall have hinged metal access doors as required by type of construction.

B. Minimum door size shall be 8' x 8x. Doors shall be of sufficient size to adequately service, repair, replace or inspect the equipment. Locations of access doors in ceilings shall be coordinated to avoid conflict with ceiling mounted devices (lighting fixtures, fire alarm devices, ceiling diffusers, sprinkler heads, etc.). Locations shall be approved by Architect/Engineer.

3.21 PROTECTION OF WORK

A. The Contractor shall protect equipment, fixtures and work from damage. Damaged work will be rejected and replaced at the expense of the Contractor. Where possible, rooms containing new plumbing fixtures shall be kept locked until the building is turned over to the User Agency. Immediately after installation of each plumbing fixture, it shall be covered with a fixture protector.

B. Mechanical equipment shall be protected from and from the weather. Provide adequate and proper storage facilities for items during the progress of the work.

3.22 PROJECT CLOSEOUT DOCUMENTS

A. Prior to the final acceptance of the project the Contractor shall deliver to the Architect/Engineer for review, the following in two three-ring binders:

1. Certificates of approval from local regulatory agencies.

2. Extended equipment warranties.

3. Signed receipts showing that keys to access doors, locked equipment, underground valve wrenches and vandal-proof screwdrivers have been delivered to the User Agency.

4. Valve tag list.

5. Operating instruction manuals which shall include copies of reviewed submittals and shop drawings include review sheet.

6. Results of potable water sterilization tests.

7. Performance tests of backflow preventer.

8. Cross connection testing and certification of each medical gas system.

9. NFPA 13 and 14 acceptance certificates for the sprinkler and standpipe systems.

10. Copy of reviewed sprinkler and standpipe system shop drawings.

11. Signed receipt showing that the hydronic temperature/pressure test kit has been delivered to the User Agency.

12. HVAC test and balance reports.

13. Record drawings.

B. Final payment will be withheld until each applicable item has been provided to and is found satisfactory by the Architect/Engineer.

END OF SECTION

SECTION 15012 – ENVIRONMENTAL CONTROL SERVICES

PART 1 GENERAL

1.01 SUMMARY

A. The purpose of the specification is to define the approved methods and equipment or the use of temporary dehumidification/air conditioning system during construction.

B. The dehumidification system shall be part of the General Contract. Any extra hardware, components or accessories, i.e., duct work, temperature control, transformers, inlet/outlet transitions, etc. Shall be considered incidental with no separate payment for any of the above items.

1.02 SUBMITTALS

A. Dehumidification supplier shall provide drawings showing equipment placement and sizes, air distribution and power cable routing.

PART 2 GENERAL

2.01 ENVIRONMENTAL CONTROLS

A. Dehumidification / Air conditioning equipment shall be used to control the environment in the space 24 hours a day while interior finishes are being stored or installed.

B. Pressurization, all construction areas to be in negative pressure by means of Contractors “Means and Methods”. Contractor shall submit method to Engineer for approval prior to any installation.

2.02 TEMPERATURE CONTROLS

A. Auxiliary heat, cooling and/ or insulation may be necessary to maintain the temperature at a level acceptable to the contractor performing the reconstruction inside the work space. This auxiliary equipment must be approved for use by the dehumidification/ Air conditioning equipment supplier and shall meet the following requirements.

1. Heaters and refrigerant-type systems will be installed in the process air supply between the dehumidifier and the space as close to the space as possible.
2. Only, electric, indirect gas fired and steam coil auxiliary heaters will be used. No direct fired space heaters will be allowed during the construction.
3. Heaters will be equipped with controls that automatically turn the heater off if the airflow is interrupted or the internal temperature of the heater exceeds its designed temperature or that of the supply duct.
4. Seal the area where dehumidification is introduced to allow the air to escape away from the entry point while maintaining a slight positive pressure unless dust from the operation is hazardous. The design of the filter system, if necessary, will be

designed so that it does not interfere with the dehumidification equipment's ability to control the relative humidity and temperature parameters in that space. Do not re-circulate the air from the space or from filtration equipment back through the dehumidifier during reconstructions unless authorized by the dehumidification supplier.

2.03 SPECIFIED EQUIPMENT SIZE AND TYPE

A. Style and size of equipment will be determined by the contractor. The style and size may vary depending on volume of air space needing to be controlled, time of year, containment of area, and any other requirement that may diminish the ability to control the environment.

1. Basis of bid to be 250 square foot per ton of HVAC.

2.04 POWER

A. The required electrical power will not be supplied by the owner. The necessary voltage and amperes needed for operation will be coordinated with the general contractor. The contractor is responsible for providing temporary power necessary to energize the dehumidification/ Air conditioner system.

PART 3 EXECUTION

3.01 INSTALLATION

A. The contractor shall install dehumidification/ Air conditioning equipment in accordance with manufacturer's written instructions and approved submittals.

B. Dehumidification/ Air conditioning supplier will use flexible duct and temporary ducting to distribute the dry air through the controlled space. Distribution of dry air will be decided by the dehumidification supplier and the general contractor.

C. Temporary power cord will be used to energize the dehumidifiers / Air conditioners.

END OF SECTION

SECTION 15055 – MOTORS

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install high efficiency single- and three-phase electric motors required for equipment supplied under this division of Work as indicated by the Contract Documents, with supplementary items necessary for proper installation. Refer to Electrical Drawings for motor starter sizes. Disconnect switches to be furnished in Division 16.

B. The Fire Suppression, Plumbing and HVAC Subcontractors shall furnish starters for Fire Suppression, Plumbing and HVAC Work. Motor starters shall be provided in accordance with Division 15 Specifications. All motors furnished in mechanical equipment rooms shall have starters furnished and installed as part of Division 15 unless control by a variable speed drive.

C. Motors rated at less than 190 Watts and intended for intermittent operation need not conform to these Specifications.

D. ECM (Electronically Commutated Motor) motors on terminal units, fan-coil units, and computer room air conditioning units are except from specification requirements that can not apply due to different electrical design characteristics.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and Workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. AFBMA 9 – Load Ratings and Fatigue Life for Ball Bearings.

2. AFBMA 11 – Load Ratings and Fatigue Life for Roller Bearings.

3. EISA - The Energy Independence & Securities Act 2007.

4. ANSI/EEE 112 – Test Procedure for Polyphase Induction Motors and Generators.
5. ANSI/NEMA/ MG 1 – Motors and Generators Part 31.
6. NFPA 70 – National Electrical Code.
7. ANSI C19 – Industrial Control Apparatus.
8. NEMA ICS – Industrial Control and Systems.
9. NEMA RV 3 - Application and Installation Guidelines for Flexible and Liquidtight Flexible Metal and Nonmetallic Conduits
10. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable
11. NEMA FB 2.20 - Selection and Installation Guidelines For Fittings for Use With Flexible Electrical Conduit and Cable
12. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
13. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports
14. NEMA OS 3 - Selection and Installation Guidelines for Electrical Outlet Boxes
15. UL 508 – Industrial Control Equipment.
16. ANSI/EEE 117 – Standard Test Procedure for Evaluation of Systems of Insulating Materials for Random Wound AC Electric Machinery.
17. ANSI/NEMA MG 2 – Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors.
18. ANSI/UL 674 – Electric Motors and Generators for Use in Hazardous (Classified) Locations.
19. ANSI/UL 1004 – Electric Motors.

1.04 QUALITY ASSURANCE

A. Motors associated with variable frequency drives (VFD) shall be inverter-duty rated, and provided with grounded shaft or ceramic bearings to insulate shaft, and Class F 105 degrees C rise insulation. Ref. NEMA MG1 Part 31.

B. Conform to NFPA 70.

1.05 SUBMITTALS

A. All motors provided by the Contractor shall be of the same manufacturer unless they are an integral part of the piece of equipment to which they are attached.

B. Product Data: Provide the following information for each motor:

1. Manufacturer.
2. Rated full load horsepower.
3. Rated volts.
4. Number of Phases.
5. Insulation Class.
6. Frequency in Hertz.
7. Full load amperes (FLA).
8. Locked rotor amperes (LRA) at rated voltage or NEMA code letter.
9. Nominal speed at full load (rpm).
10. Service factor.
11. NEMA design letter.
12. NEMA machine type (ODP, WP-I, TEFC, etc.).

C. For motors one horsepower and larger, include the following additional information:

1. NEMA frame size.
2. NEMA insulation system classification. For motors required to be installed outdoors, include information showing compliance for outdoor application.
3. Maximum ambient temperature for which motor is designed.
4. Time rating.
5. Bearing size and type data.
6. Guaranteed efficiency and power factor at full load, 75% load, 50% load, 25% load and 0% load.

D. For motors 20 horsepower and larger, include the following additional information:

1. No load amperes.
2. Safe stall time.
3. Guaranteed efficiency and power factor at full load, 75% load, 50% load, 25% load and 0% load.
4. Motor manufacturer's recommended maximum power factor correction capacitor (kvar) that can safely be switched with the motor.
5. Expected value of corrected power factor at no load, 50 percent, 75 percent and full load.

6. Full load amperes with corrected power factor.

7. Maximum guaranteed slip at full load.

E. Operation and Maintenance Data:

1. Submit operation and maintenance data including assembly Drawings, bearing data including replacement sizes, and lubrication instructions.

F. Alternate Motors:

1. If a motor horsepower rating larger than indicated is offered as a substitute and accepted, provide required changes in size of conductors, conduits, motor controllers, overload relays, fuses, circuit breakers, switches and other related items at no change in the Contract price.

1.06 WARRANTY

A. Provide minimum one-year manufacturer's warranty including coverage for motors one horsepower and larger.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Electrical Service: Refer to Drawing schedules for required electrical characteristics.

C. Design for continuous operation in 40 degrees C environment and for temperature rise in accordance with ANSI/NEMA MG 1 limits for insulation class, Service Factor and motor enclosure type.

1. Totally Enclosed Motors: Design for a service factor of 1.00 and an 80 degrees C maximum temperature rise in the same conditions.

2. Explosion-Proof Motors: UL approved and labeled for hazard classification, with over temperature protection.

D. Visible Stainless Steel Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency.

E. Electrical Connection: Provide adequately sized metal electrical connection box for conduit connection. For fractional horsepower motors where connection is made directly, provide metal electrical box for conduit connection.

F. Motors shall be built in accordance with the latest ANSI, IEEE and NEMA Standards and shall be fully coordinated with the equipment served, shall be of sizes and electrical characteristics scheduled and of approved manufacturer as listed below or of the same manufacturer as the equipment which they serve. Nameplate rating of motors shall match the characteristics scheduled.

G. All motors shall be designed for normal starting torque unless the driven machine requires high starting torque and shall be selected for quiet operation, free from magnetic hum.

H. All motors shall be provided with adequately sized electrical connection box for attachment of flexible conduit. Paragraph 1.03 of this specification refers to the NEMA standards and publications relevant to applications and use of both metal and liquid tight flexible conduit. When motors are connected to driven equipment by the use of a V-belt drive, they shall be furnished with adjustable rails.

I. All air handling unit motor(s) with single and fan array arrangements, exhaust fan motors, chilled and hot water pump motors shall be compatible with variable frequency drive controllers. Equipment manufacturer shall coordinate with VFD manufacturer to ensure compatibility. Characteristics of motors furnished on equipment shall be furnished to VFD manufacturer for review, prior to installing motor on equipment. VFD's shall be furnished with driven equipment and shall be run tested as an equipment unit at factory prior to shipment. Submit run test report prior to shipping. F.O.B. of motors to factory shall be by the equipment manufacturer.

J. Motors shall be open drip-proof type, except where specified or noted otherwise on the construction drawing.

K. Motors ¼ to ¾ hp shall be Subtype II and meet the minimum requirements of EPAct92 for minimum NEMA nominal efficiency motors.

L. Motors 1 to 200 hp shall be Subtype I and meet the minimum requirements of NEMA Table 12-12 for NEMA premium efficiency motors.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Manufacturer: Company specializing in the manufacture of electric motors for HVAC and plumbing equipment use, and their accessories, with minimum three (3) years documented product development, testing and manufacturing experience.

1. Baldor - Super E – NEMA Premium Efficiency.

2. Marathon - NEMA Premium Efficiency.

3. Siemens – NEMA Premium EfficiencyU.S. Electrical – NEMA Premium Efficiency.

2.03 SINGLE PHASE POWER - SPLIT PHASE MOTORS

A. Starting Torque: Less than 150 percent of full load torque.

B. Starting Current: Up to seven times full load current.

C. Breakdown Torque: Approximately 200 percent of full load torque.

D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.

E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

F. Single phase motors, shall be less than 3/4 horsepower and shall be permanent split phase, capacitor start, induction run, 120 volt, 60 hertz motors with dripproof enclosures except as hereinafter specified. These motors shall have built-in thermal overload protection and shall be rated for temperature rise as hereinbefore specified for 3-phase motors.

2.04 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

A. Starting Torque: Exceeding one fourth of full load torque.

B. Starting Current: Up to six times full load current.

C. Multiple Speed: Through tapped windings.

D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum Service Factor as specified herein, prelubricated sleeve or ball bearings, automatic reset overload protector.

E. Single phase motors shall be less than 3/4 horsepower and shall be permanent split phase, capacitor start, induction run, 120 volt, 60 hertz motors. These motors shall have built-in thermal overload protection with automatic reset and shall be rated for temperature rise as hereinbefore specified for 3-phase motors.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

A. Starting Torque: Three times full load torque.

B. Starting Current: Less than five times full load current.

C. Pull-up Torque: Up to 350 percent of full load torque.

D. Breakdown Torque: Approximately 250 percent of full load torque.

E. Motors: Capacitor in series with starting winding; capacitor-start/capacitor-run motors shall have two capacitors in parallel with run capacitor remaining in circuit at operating speeds.

F. Enclosures shall be of the open dripproof type with a service factor as specified herein and Class B insulation rated at 90 degrees C temperature rise measured above 40 degrees C room ambient condition at full load, unless otherwise noted.

G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

H. Single phase motors, in general, shall be less than 3/4 horsepower and shall be permanent split phase, capacitor start, induction run, 120 volt, 60 hertz motors. These motors shall have built-in thermal overload protection and shall be rated for temperature rise as hereinbefore specified for 3-phase motors.

2.06 THREE PHASE POWER - SQUIRREL CAGE MOTORS

A. Enclosures shall be of the open drip proof type with a service factor as specified herein and Class B insulation rated at 90 degrees C temperature rise measured above 40 degrees C room ambient condition at full load, unless otherwise noted.

B. All motors 3/4 horsepower and larger, unless smaller motors are indicated to be supplied as 3-phase, shall be 3-phase and shall be squirrel cage high efficiency induction type with standard NEMA frame sizes.

C. Three phase motors not connected to variable frequency drives are to be protected for phase loss and phase unbalance protection.

D. Motors 1 HP and larger shall have integral frames.

E. Starting Torque: Between one and one and one-half times full load torque.

F. Starting Current: Six times full load current.

G. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics.

H. Design, Construction, Testing and Performance: Conform to ANSI/NEMA MG 1 for Design B motors.

I. Insulation System: NEMA Class B or better.

J. Testing Procedure: In accordance with ANSI/IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and compliance with performance data.

K. Motor Frames: NEMA standard T-frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

L. Bearings:

1. Ball or roller type, double shielded with continuous grease relief to accommodate excessive pressure caused by thermal expansion or over lubrication.

2. All motor bearings shall be factory prepacked with a nondetergent lubricant and shall be provided with lubrication fitting arranged to provide easy access when installed on the driven apparatus except as noted hereinafter.

3. Permanently lubricated factory-sealed motors may be provided in fractional horsepower sizes only where they are an integral part of a piece of approved apparatus.

4. All bearings shall be designed for L-10, 40,000 hour minimum life hours of continuous service. Calculate bearing load with NEMA minimum V-belt pulley with belt centerline at end of NEMA standard shaft extension. Direct driven fans may require specific bearings other then ball type, verify equipment specification where motor may be used where bearing life requirement may exceed L-10 rating. Stamp bearing sizes on nameplate.

M. Sound Power Levels: Refer to ANSI/NEMA MG 1.

N. Part Winding Start (Where Indicated): Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel. Bearings shall be double shielded with waterproof non-washing grease.

O. Nominal Efficiency and Power Factor: Meet or exceed values as scheduled at load and rated voltage when tested in accordance with ANSI/IEEE 112.

P. Motors one horsepower and larger shall be provided with a copper frame grounding lug of hydraulic compression design, for installation by the electrical subcontractor.

2.07 STARTING EQUIPMENT

A. Each motor shall be provided with proper starting equipment. Starting equipment shall be furnished by Section 15060.

B. Relays and equipment supplied by this Contractor shall be integral with electrical equipment supplied.

2.08 RATING

A. Speed and Size: Speed and approximate horsepower ratings are specified in equipment Specification Sections or are indicated on the Drawings. Furnish motors sufficiently sized for the particular application and with full-load rating not less than required by the driven equipment at specified capacity. Size motors so as not to overload at any point throughout the normal operating range.

B. Voltage:

1. Single phase: 115 volts for 120-volt nominal system voltage.

2. Three phase: 200 volts for 208-volt nominal system voltage.

3. Three phase: 230 volts for 240-volt nominal system voltage.

4. Three phase: 230/460 volts for 240/480-volt nominal system voltage.

5. Three phase: 460 volts for 480-volt nominal system voltage.

C. Frequency: 60 Hertz.

D. Efficiency: Provide energy-efficient motors meeting the requirements of NEMA MG1-12.55A, Table 12Y and MG 1.41.3. Efficiency to be determined by testing in accordance with NEMA MG 112.53 using IEEE 112A – Method B.

E. Service Factor: According to NEMA MG 1-12.47 but not less than those indicated per the Table below.

F. Table: NEMA Open Motor Service Factors:

Horsepower	3600 RPM	1800 RPM	1200 RPM	900 RPM
1/6 – 1/3	1.35	1.35	1.35	1.35
½	1.25	1.25	1.25	1.15
¾	1.25	1.25	1.15	1.15
1	1.25	1.15	1.15	1.15
1.5-150 and above 150	1.15	1.15	1.15	1.15

PART 3 - EXECUTION

3.01 APPLICATION

A. Single-phase motors for shaft mounted fans shall be split phase type.

B. Single-phase motors for shaft mounted fans or blowers shall be permanent split capacitor type.

C. Single-phase motors for fans shall be capacitor start, capacitor run type.

D. Motors located in exterior locations and in direct drive axial fans, roll filters, humidifiers and draw-through air units shall be totally enclosed weatherproof epoxy-sealed type.

3.02 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Properly install and align motors after installation on the driven equipment.

D. Motor feeders shall be free of splices. In special cases when splice-free feeders are impractical, splices may be allowed given prior written approval from the Owner.

E. Use crimp-on, solderless copper terminals on the branch circuit conductors. For motors 20 horsepower and larger, use 5300 Series 3M motor lead splicing kit or approved equal.

F. When the motor and equipment are installed, the motor's nameplate must be in full view.

END OF SECTION

SECTION 15060 – MOTOR STARTERS

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. This Section specifies the requirements for motor control with full voltage non-reversing and combination magnetic motor starters.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

2. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

3. NEMA AB 1 - Molded Case Circuit Breakers.

4. NEMA KS 1 - Enclosed Switches.

5. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

1.04 SUBMITTALS

A. Product Data:

1. Submit manufacturer’s product data.

B. Record Documents:

1. Submit dimensioned Drawings showing size, circuit breaker, fusible switch and combination starter arrangement and equipment ratings including, but not limited to, voltage, bus ampacity, integrated short circuit ampere rating.

2. Provide data on relays, pilot devices, switching and overcurrent protection.

3. Indicate enclosure NEMA rating and material.

C. Operation and Maintenance Data:

1. Provide operating and maintenance manuals.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Approved Manufacturers: General Electric Co., Square D, Cutler Hammer/Westinghouse, Siemens, or approved equal.

2.03 MOTOR STARTERS

A. Each motor shall be provided with proper starting equipment.

1. Starting equipment, unless specified or scheduled to the contrary, shall be provided by the trade furnishing the motor.

2. All motor starting equipment provided by any one trade shall be of the same manufacturer unless such starting equipment is an integral part of the equipment on which the motor is mounted.

3. The Division 15 Subcontractor shall furnish all starters for Division 15 Work, except those started scheduled to be provided in 16 Motor Control Centers. Motor control centers shall be provided under this Section 16.

4. All applicable motors shall be compatible with variable speed motor controller. Variable speed motor controllers shall be furnished with the drive equipment, run tested and certified at factory prior to shipping. Certified tests shall be submitted to Owner with submittals.

B. Magnetic Motor Starter:

1. Type: Provide magnetic, full-voltage, nonreversing motor starters unless otherwise indicated.

2. Overload Relays: Provide an ambient-compensated thermal overload relay in each phase leg.

3. Contactor:

    a. Size contactors according to NEMA standards or as shown; however, minimum shall be size 1.

    b. Provide main pole in each phase leg, the number and type of auxiliary contacts to perform the required functions, and two (2) spare auxiliary contacts, one (1) normally open and one (1) normally closed.

    c. Use double break contacts of silver-cadmium oxide or similar material to minimize sticking or welding.

    d. Provide contactor coils suitable for continuous operation at 120 volts, 60 hertz.

4. Control Power Transformer:

    a. Voltage: Provide in each enclosure a single-phase control power transformer with a 480-volt primary and a 120-volt secondary.

    b. Fuses:

        1) Fuse both primary lines of the transformer and connect to Line 1 and Line 2.

        2) Fuse the secondary line leaving transformer terminal X1.

        3) Ground the line leaving terminal X2.

        4) Use rejection-type fuse clips and RK-1 type current limiting fuses on the primaries.

        5) Coordinate primary fuses with secondary fuse to clear a faulted transformer but not blow on magnetizing in-rush current.

    c. Size: Provide manufacturer's standard size transformer unless the manufacturer of vibration switches requires a larger size.

5. Enclosure: Provide a NEMA 1 enclosure unless otherwise indicated on Drawings.

6. Control Devices: Provide control devices as indicated on the Drawings, in front of enclosure as follows:

    a. Selector Switches: Heavy-duty, oil-tight, maintained contact, 3-position, with marked nameplate HAND-OFF-AUTOMATIC, unless otherwise indicated on two speed motors provide OFF-LOW-HI selector switch.

b. Indicating Lights: Indicating lights shall be heavy-duty LED type. Neon lamps are not acceptable. Provide red (running) lens. On two-speed starters, provide amber (low speed) and red (high speed).

C. Combination Fused Switch-Starter:

1. Type: Provide combination fused switch and magnetic motor.

2. Fuses: Provide fuses sized per the Drawings and in accordance with Section 16.

3. Starter: Provide magnetic motor starter as specified herein.

4. Enclosure: Provide a NEMA 1 enclosure unless otherwise indicated on Drawings.

D. Manual Motor Starters: Provide line voltage manual motor starters for each single-phase motor. Include bimetallic thermal overload protection in each ungrounded phase leg. Provide the toggle-operated starter in a NEMA 1 enclosure unless otherwise indicated.

E. Motor Starterfor three phase motors 20 horsepower and below shall be combination type starter/disconnect, full voltage non reversing (FVNR), with magnetic NEMA rated contractors rated for horsepower of motor served, adjustable trip magnetic circuit breaker disconnect (motor circuit protector) capable of being padlocked in the open position, 10K AIC minimum fault rating with higher rating when necessary, due to available fault levels. Starters shall have a fused 100VA minimum control transformer (120V, unless required otherwise), HOA switch, push to test operating pilot light, solid state overload relays set for actual motor nameplate full load amps, phase failure and phase reversal protection relay, minimum two N.O. and two N.C. auxiliary contacts and terminal blocks factory prewired for field wiring. Starter shall be horsed in a NEMA 1 enclosure for indoor locations and NEMA 3R enclosure for outdoor or wet locations.

F. Starters for motors 25 horsepower and above shall be soft start type or variable frequency drives.

2.04 SOFT START MOTOR STARTERS

A. Soft start type Starters shall be microprocessor controlled, reduced voltage, stepless, solid state, soft start, non-reversing, and combination motor starter/disconnects. Overload protection shall be electronic type field selectable for Class 10, 20, or30 type relay curves with protection provided with each phase. Motor service factor shall be selectable at 1.0, 1.15 or1.25. Starters shall have single phase, overvoltage, phase rotation, stalled motor, ground fault and line-to-line current protection. Starter shall have a 100VA minimum control power transformer (120 Volt, unless required otherwise.

B. Starters shall have a start ramp time adjustable from 0-120 seconds, adjustable deceleration profile, 0-60 seconds, auto ranging watt/watt-hour meter, elapsed time meter and scrolling volt/ammeters, accumulated event recorder (25 minimum events) time and date stamped, battery backed up menu parameters and static non-volatile operating setting with pass code protection.

C. Starters shall have LCD and LED or equivalent status and diagnostics displays with full fault annunciation, incandescent push to test type indicating light to indicate motor operation and rotary Hand-Off-Auto control switch.

D. Software selectable relay outputs shall consist of a general fault relay and a minimum of two relay outputs user selected to any of the following functions: Run, Up to Speed, Motor Trip, Motor Pre-Trip alarm.

E. The starter shall have a circuit breaker (motor circuit protector) disconnect operable from outside the enclosure with the enclosure closed, padlockable in off position.

F. Starter shall contain a starting duty NEMA rated bypass contractor with separate Class 20 electronic overloads relays (field selectable to the motor amperage) to allow starting the motor across the line if the solid state controllers fails. Bypass contractors shall also close to bypass the solid state controller during normal operation once the motor is up to speed.

G. All components (controller, bypass contractor and motor circuit protectors) shall be housed in a single enclosure, NEMA Type 1 for indoor locations, NEMA Type3R for outside locations.

H. Starter shall have a minimum 10,000 AIC RMS amperes interrupting rating, unless required higher by available fault capacity.

I. Consult with the Owner and programs all parameters and settings. Provide a hard copy of all settings at completion of startup and checkout.

J. Soft starters shall be by Allen Bradley, Cutler-Hammer, Brashaw or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Anchor assembly to housekeeping pad.

D. Select overload heaters for motor in accordance with manufacturer's recommendations for the voltage and full load amperes listed on the nameplate data of each motor actually installed.

E. Adjust operating mechanisms for free mechanical movement.

F. Touch-up scratched or marred surfaces to match original finish.

G. Individual motor starters are furnished under this Section, however, the installation and all connections are to be done under Division 16, similar to the Work done for motors served from a Motor Control Center.

H. Deliver starters and wiring devices which have not been factory-in-stalled on equipment unit to electrical Installer for installation.

I. Install power and control connections for motors to comply with NEC and applicable provisions of Division-16 sections. Install grounding where non-grounded isolation of motor is indicated.

END OF SECTION

SECTION 15140 – SUPPORTS AND SLEEVES

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install supports, hangers, anchors, sleeves and bases for all pipe, duct, equipment, system components and accessories, indicated by the Contract Documents with all supplementary items necessary for complete, code compliant and approved installation

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and Workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. International Mechanical Code 2015.
2. International Plumbing Code 2105.
3. International Fuel Gas Code 2015.
4. ASME B31.2 - Fuel Gas Piping.
5. ASME B31.9 - Building Services Piping.
6. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
7. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
8. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
9. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
10. MSS SP-90 - Guidelines on Terminology for Pipe Hangers and Supports.
11. NFPA 13 - Installation of Sprinkler Systems.

12. NFPA 14 - Installation of Standpipe and Hose Systems.

13. NFPA 99 - Standard for Health Care Facilities.

14. UL 203 - Pipe Hanger Equipment for Fire Protection Service.

15. SMACNA - HVAC Duct Construction Standards.

16. Underwriters Laboratories Standards and Listings.

1.04 QUALITY ASSURANCE

A. Materials and application of pipe hangers and supports shall be in accordance with MSS-SP-58 and SP-69 unless noted otherwise.

B. Support and sleeve materials and installation shall not interfere with the proper functioning of equipment.

C. Contractor shall be responsible for structural integrity of all hangers, supports, anchors, guides, inserts and sleeves. All structural hanging materials shall have a minimum safety factor of five.

D. Installer Qualifications: Utilize an installer experienced in performing Work of this Section who is experienced in installation of Work similar to that required for this Project and per the minimum requirements of MSS SP-89. Field welding of supports shall be by certified welders qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX using welding procedures per the minimum requirements of MSS SP-58.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer’s catalog data including code compliance, load capacity, and intended application.

B. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

C. Shop Drawings: Submit detailed Drawings of all shop or field fabricated supports, anchors and sleeves, signed and sealed by a qualified State of Texas registered professional engineer. Indicate size and characteristics of components and fabrication details and all loads exceeding 250 pounds imposed on the base building structure.

1.06 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer’s ordering instructions and lead time requirements to avoid construction delays.

B. Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact. Maintain in place until installation.

C. Store materials protected from exposure to harmful weather conditions.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Manufacturers: Hangers and Supports

1. Anvil International.
2. Kinder.
3. Cooper B-Line.
4. C & S Mfg. Corp.
5. Hubbard Enterprises/Holdrite
6. National Pipe Hanger Corporation.
7. Power Strut.

2.03 HANGERS AND SUPPORTS

A. General:

1. Refer to individual system and equipment Specification Sections for additional support requirements. Comply with MSS SP-69 for support selections and applications that are not addressed within these Specifications.
2. Utilize hangers and supports to support systems under all conditions of operation, allowing free expansion and contraction, and to prevent excessive stresses from being introduced into the structure, piping or connected equipment.
3. All pipe supports shall be of the type and arrangement to prevent excessive deflection, to avoid excessive bending stresses between supports, and to eliminate transmission of vibration.
4. Design hangers to impede disengagement by movement of supported pipe.

5. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.

6. Wire or perforated strap iron will not be acceptable as hanger material.

7. Hanger rods shall be threaded on both ends, threaded one end, or continuous threaded, complete with adjusting and lock nuts.

8. Fasteners requiring explosive powder (shooting) or pneumatic-driven actuation will not be acceptable under any circumstances.

9. Plastic anchors or plastic expansion shields will not be permitted under any circumstances.

10. Hangers and clamps supporting and contacting individual non-insulated brass or copper lines shall be copper or copper plated. Support individual non-insulated brass or copper lines 4 inches and smaller with adjustable swivel ring hangers. Where non-insulated brass or copper lines are supported on trapeze hangers or channels, the pipes shall be isolated from these supports with approved flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp. Plastic tape is not acceptable.

11. Hangers and clamps supporting and contacting glass piping shall be in accordance with the piping manufacturer's published recommendations and shall be fully lined with minimum 1/4 inch neoprene padding. The padding material and the configuration of its installation shall be submitted for approval.

12. Hangers and clamps supporting and contacting plastic piping shall be in accordance with the piping manufacturer's published recommendations and shall be factory coated or padded to prevent damage to piping.

13. Field fabricated supports shall be constructed from ASTM A36/A36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.

B. Finishes: All ferrous hangers, rods, inserts, clamps, stanchions, and brackets on piping within interior non-corrosive environments, shall be dipped in Zinc Chromate Primer before installation. Rods may be galvanized or cadmium plated after threading, in lieu of dipping zinc chromate. All hangers and supports exposed to the weather, including roofs and building crawl space areas, shall be galvanized or manufactured from materials that will not rust or corrode due to moisture. All hangers and supports located within corrosive environments shall be constructed from or coated with materials manufactured for installation within the particular environment.

C. Vertical Piping:

1. Supports for vertical riser piping in concealed areas shall utilize double bolt riser clamps, with each end having equal bearing on the building structure at each floor level.

2. Supports for vertical riser piping at floor levels in exposed areas (such as fire protection standpipe in stairwells) shall be attached to the underside of the penetrated structure utilizing drilled anchors, two hanger rods (sized as specified), and socket clamp with washers.

3. Two-hole rigid pipe clamps or four-hole socket clamps with washers may be used to support pipe directly from adequate structural members where floor-to-floor distance exceeds required vertical support spacing and lines are not subject to expansion and contraction.

D. Trapezes: Where multiple lines are run horizontally at the same elevation and grade, they may be supported on manufactured channel, suspended on rods or pipes. Trapeze members including suspension rods shall be properly sized for the quantity, diameters, and loaded weight of the lines they are to support.

E. Ductwork: All ductwork shall be supported in accordance with SMACNA recommendations for the service involved. Horizontal ducts supported using galvanized steel bands shall extend up both sides and onto the construction above, where they shall turn over and be secured with bolts and nuts fitted in inserts set in the concrete, bolted to angles secured to the construction above, or secured in another approved manner.

F. Terminal Units:

1. Terminal units weighing up to 150 pounds shall be supported by four (4) 1 inch wide sheet metal straps with ends turned under bottom of unit at corners.

2. Each band shall be secured by not over 3/4 inch in length, 1/4 inch diameter sheet metal screws – two (2) on bottom of unit and one (1) on each side.

3. The other strap end shall be attached to the structure by 1/4 inch diameter threaded bolt into the concrete insert or into drilled-hole threaded concrete expansion anchor.

4. Where interference occurs, overhead of the box, not allowing direct vertical support by straps, provide trapeze channels suspended by 1/4 inch diameter galvanized threaded rods providing such channels do not block access panels of units.

5. Terminal units weighing more than 150 pounds shall be supported per the terminal unit manufacturer's installation instructions using threaded rod and hanger brackets located per manufacturer's drawing.

G. Fixture and Equipment Service Piping:

1. Piping at local connections to plumbing fixtures and equipment shall be supported to prevent the weight of the piping from being transmitted to fixtures and equipment.

2. Makeshift, field-devised methods of plumbing pipe support, such as with the use of scrap framing materials, are not allowed. Support and positioning of piping shall be by means of engineered methods that comply with IAPMO PS 42-96. These shall be Hubbard Enterprises/Holdrite support systems, C & S Mfg. Corp. or Owner-approved equivalent.

3. Supports within chases and partitions shall be corrosion resistant metal plate, clamps, angles or channels, and aligned with structure in the vertical or horizontal position. Plastic supports are not allowed unless approved by Owner.

4. Horizontal supports within chases and partitions that are attached to studs shall be attached at both ends. Drywall shall not be relied upon to support the piping.

5. Supports for plumbing fixture water service piping within chases and partitions may be attached to cast iron drain and vent pipe with approved brackets and pipe clamps.

6. Piping exposed on the face of drywall shall be supported with corrosion resistant metal channels that are attached to wall studs. Drywall shall not be relied upon to support the piping.

7. Piping supported from the floor shall utilize corrosion resistant metal channels or brackets that are anchored to the floor slab.

8. All water piping shall be isolated from building components to prevent the transmission of sound.

9. All copper or brass lines shall be isolated from ferrous metals with dielectric materials to prevent electrolytic action. Plastic tape is not an acceptable isolation material.

H. Fire Protection Piping: All hangers and supports for fire standpipe systems and fire sprinkler systems shall be Factory Mutual and Underwriters' Laboratories, Inc. listed and labeled.

I. Inserts:

1. Cast-in-place concrete inserts shall comply with MSS-SP-69, U.L. and F.M. approved, and sized to suit threaded hanger rods.

2. Inserts shall have malleable iron case with galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods. Suitable concrete inserts for pipe and equipment hangers shall be set and properly located for all pipe and equipment to be suspended from concrete construction. If the inserts are later found not to be in the proper location for the placement of hangers, then drilled anchors shall be installed. Drilled anchors in concrete or masonry shall be submitted for the approval.

3. Manufactured inserts for metal deck construction shall have legs custom fit to rest in form valleys.

4. Shop fabricated inserts shall be submitted and approved by Owner prior to installation.

5. Inserts shall be of a type that will not interfere with structural reinforcing and that will not displace excessive amounts of structural concrete.

J. Pipe Shields: Provide pipe shields in accordance with insulation manufacturer's published recommendations. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier.

K. Housekeeping Pads:

1. Provide minimum 4 inch reinforced concrete pads with chamfered corners and equipment bases for all outdoor equipment on grade, floor mounted equipment in main central plant area, mechanical rooms, areas with floors below grade, penthouse equipment rooms, floor mounted air handling units, and where shown on Drawings.

2. Housekeeping pads shall extend minimum of 4 inch on all sides beyond the limits of the mounted equipment unless otherwise noted.

3. Provide galvanized anchor bolts for all equipment placed on concrete pads or on concrete slabs of the size and number recommended by the equipment manufacturer.

2.04 PIPE AND DUCT PENETRATIONS

A. General:

1. Seal penetrations through all rated partitions, walls and floors with U.L. tested assemblies to provide and maintain a rating equal to or greater than the partition, wall or floor.

2. Inside diameter of all sleeves or cored holes shall provide sufficient annular space between outside diameter of pipe, duct or insulation to allow proper installation of required fire and water proofing materials and allow for movement due to expansion and contraction.

3. Exposed ceiling, floor and wall pipe penetrations within finished areas (including exterior wall faces) shall be provided with chrome plated, brass or stamped steel, hinged, split-ring escutcheon with set screw or snap-on type. Inside diameter shall closely fit pipe outside diameter or outside of pipe insulation where pipe is insulated. Outside diameter shall completely cover the opening in floors, walls, or ceilings. In exterior, damp, or corrosive environments, use Type 302 stainless steel escutcheons.

B. Floor Pipe Penetrations:

1. Seal penetrations through all floors to provide and maintain a watertight installation.

2. Sleeves cast in the slab for pipe penetrations shall be Schedule 40 steel, ASTM A53, with 2 inch wide annular fin water-stop continuously welded at midpoint of slab. Entire assembly shall be hot-dipped galvanized after fabrication. Water-stop shall be same thickness as sleeve.

3. Cored holes in the slab for pipe penetrations shall be provided with a Schedule 40 steel, ASTM A53 sleeve, with 2 inch wide annular fin water-stop continuously welded at point on sleeve to allow countersinking into slab and waterproofing. Entire sleeve assembly shall be hot-dipped galvanized after fabrication. Water-stop shall be same thickness as sleeve.

4. All sleeves shall extend a minimum of two inches above finished floor.

5. Where job conditions prevent the use of a sleeve that extends two inches above the slab, Link-Seal mechanical casing seals manufactured by Thunderline Corporation may be installed to provide a watertight penetration. Mechanical casing seals can be used only for relatively small diameter pipe penetrations. Verify that slab thickness allows proper installation of the link-seal assembly and the required fire stopping prior to applying this exception.

C. Wall Penetrations:

1. Where piping or ductwork passes through non-rated partition, close off space between pipe or duct and construction with gypsum wallboard and repair plaster smoothed and finished to match adjacent wall area.

2. Pipe penetrations through interior rated partitions shall be provided with adjustable prefabricated U.L. listed fire rated galvanized sheet metal sleeves having gauge thickness as required by wall fire rating, 20 gauge minimum. EXCEPTION: When U.L. Listed assembly does not require a sleeve,

3. Pipe penetrations through exterior walls and walls below grade shall be provided with “Link-Seal” mechanical casing seal manufactured by Thunderline Corporation.

4. Ductwork penetrations through rated partitions, walls and floors shall be provided with sleeves that are manufactured integral with the damper assembly installed.

D. Flashing:

1. Coordinate flashing material and installation required for pipe and duct roof penetrations with Owner and roofing Contractor.

2. Provide flexible flashing and metal counter-flashing where ductwork penetrates exterior walls. Seal penetration water and air tight.

3. Provide acoustical flashing around ducts and pipes penetrating equipment rooms, with materials and installation in accordance with manufacturer's instructions for sound control.

E. Roof Curbs: Coordinate roof curb material and installation with Owner and roofing Contractor.

PART 3 - EXECUTION

3.01 PREPARATION

A. Conduct a pre-installation meeting prior to commencing Work of this Section to verify Project requirements, coordinate with other trades, establish condition and completeness of substrate, review manufacturer's installation instructions and manufacturer's warranty requirements.

3.02 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. Application, sizing and installation of piping, supports, anchors and sleeves shall be in accordance with manufacturer's printed installation instructions.

C. Provide for vertical adjustments after erection and during commissioning, where feasible, to ensure pipe is at design elevation and slope.

D. Install hangers and supports to allow controlled thermal movement of piping systems, permitting freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

E. Install hanger so that rod is vertical under operating conditions.

F. Supports, hangers, anchors, and guides shall be fastened to the structure only at such points where the structure is capable of restraining the forces in the piping system.

G. The load and spacing on each hanger and/or insert shall not exceed the safe allowable load for any component of the support system, including the concrete that holds the inserts. Reinforcement at inserts shall be provided as required to develop the strength required. Contractor shall be responsible for engaging a structural engineer as required for design and review at support systems.

H. Do not hang pipe, duct or any mechanical/plumbing item directly from a metal deck or locate on the bottom chord of any truss or joist unless approved by the Structural Engineer of Record.

I. All supports shall be designed and installed to avoid interference with other piping, hangers, ducts, electrical conduit, supports, building structures, equipment, etc.

J. Piping supports shall be independent from ductwork supports. Combining supports is not permitted.

K. Provide all supporting steel required for the installation of mechanical equipment and materials, including angles, channels, beams, etc. to suspended or floor supported tanks and equipment. All of this steel may not be specifically indicated on the Drawings.

L. All piping and ductwork supports shall be designed and installed to allow the insulation to be continuous through the hangers.

M. Adjustable clevis hangers shall be supported at rods with a nut above and below the hanger.

N. All hanger rods shall be trimmed neatly so that 1 inch of excess hanger rod protrudes beyond the hanger nut. In the event a rod is intentionally but temporarily left excessively long (for sloped or insulated lines for example), the Contractor shall take appropriate measures to protect the pipe or other materials from damage.

O. Install hangers to provide minimum ½ inch space between finished covering and adjacent structures, materials, etc.

P. Horizontal and vertical piping in chases and partitions shall be supported to prevent movement and isolated from the supports to prevent transmission of sound.

Q. Locate hangers within 12 inches of each horizontal elbow.

R. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

S. Support riser piping independently of connected horizontal piping. Riser piping is defined as vertical piping extending through more than one floor level.

T. Support riser piping at each floor level and provide additional supports where floor-to-floor distance exceeds required vertical support spacing. Installation of riser clamps and welded steel riser supports shall not allow weight of piping to be transmitted to floor sleeves.

U. Steel Bar Joists: Hanger rods shall be secured to angle irons of adequate size; each angle shall span across two or more joists as required to distribute the weight properly and shall be welded or otherwise permanently fixed to the top of joists.

V. Steel Beams: Where pipes and loads are supported under steel beams, approved type beam clamps shall be used.

W. Pre-Cast Tee Structural Concrete: Hanger supports, anchors, etc. attached to the precast, double tee, structural concrete system shall be installed in accordance with approved Shop Drawings only. Holes required for hanger rods shall be core drilled in the "flange" of the double tee only; impact type tools are not allowed under any circumstances. Core drilling in the "stem" portions of the double tee is not allowed. Holes core drilled through the "flange" for hanger rods shall be no greater than 1/4 inch larger than the diameter of the hanger rod. Hanger rods shall supported by means of bearing plates of size and shape acceptable to the Architect/Engineer, with welded double nuts on the hanger rod above the bearing plate. Cinch anchors, lead shields, expansion bolts, and studs driven by explosion charges are not allowed under any circumstances in the lower 15 inches of each stem and in the "shadow" of the stem on the top side of the "double tees".

X. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Y. Inserts:

1. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

2. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3. Install anchors in concrete after concrete is placed and completely cured. Install anchors according to manufacturer's written instructions..

Z. Flashing:

1. Coordinate all roof flashing with requirements of Division 07.

AA. Pipe Shields:

1. Provide shields at each hanger supporting insulated pipe.

2. Provide shields of the proper length to distribute weight evenly and to prevent compression of insulation at hanger.

3. Install shield so that hanger is located at the center of the shield.

4. Attach shield to insulation with adhesive to prevent slippage or movement.

BB. Equipment Anchor Bolts:

1. Foundation bolts shall be placed in the forms when the concrete is poured, the bolts being correctly located by means of templates. Each bolt shall be set in a sleeve of sufficient size to provide ½ inch clearance around bolt.

END OF SECTION

SECTION 15172 – VARIABLE SPEED DRIVES

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install a complete variable frequency motor drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use on a standard NEMA Design B induction motor.

B. The drive manufacturer shall supply the drive and all necessary controls as specified.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. Standard 519, IEEE Guide for Harmonic Content and Control.

2. ANSI/UL Standard UL508C, Underwriter's Laboratories.

3. ICS 7.0, AC Adjustable Speed Drives, National Electrical Manufacturer's Association (NEMA).

4. IEC 16800 Parts 1 and 2.

1.04 QUALITY ASSURANCE

A. Company specializing in manufacturing the products specified in this Section with minimum three (3) years experience.

B. VFD and options shall be UL listed as a complete assembly. VFD's that require the customer to supply external fuses are not acceptable.

C. VFD and options shall be tested to ANSI/UL Standard 508 and listed by a nationally recognized testing agency such as UL or ETL.

D. VFD and options shall comply with applicable requirements of the latest Standards of ANSI/UL, IEEE, and the NEC.

1.05 SUBMITTALS

A. Product Data:

1. Submit product data for components and accessories.

2. All VFD's for this Project shall be supplied by one manufacturer.

3. Submit Shop Drawings indicating outline dimensions, enclosure construction, lifting and supporting points, electrical one-line diagram, equipment electrical ratings, noise levels (including driven equipment) and total harmonic distortion (voltage and current).

4. Manufacturer shall provide terminal block to terminal block wiring diagrams coordinated with the Owner to provide a complete and functional operating system. Furnish detailed Drawings showing construction, dimensions, wiring diagrams, and installation procedures for Engineer's approval.

B. Operation and Maintenance Data:

1. Submit manufacturer's written installation instructions.

2. Submit training outline.

3. Furnish harmonic analysis verifying compliance with specified distortion levels.

4. Furnish a list of recommended spare parts.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to the Project Site under provisions of Division 01 and Division 20.

B. Accept products on Site in factory-fabricated protective container with factory installed shipping skids and lifting lugs. Inspect for damage.

C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.

1.07 EXTRA MATERIALS

A. Submit two insulated-handle tools designed for pulling fuses in accordance with ANSI/IEEE C37.46.

B. Refer to Section 26 28 13 for fuse requirements.

1.08 WARRANTY

A. VFD shall be unconditionally warranted by the manufacturer for one (1) year from the date of Substantial Completion.

B. Warranty shall include all parts, labor, shipping, field service or technician time, labor or travel expenses, and verbal or written correspondence with the VFD manufacturer or VFD manufacturer's representatives. Include correspondence which might be incidental to the proper installation and operation of the equipment.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Furnish complete VFD controllers that convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for centrifugal pump and fan control and to eliminate the need for motor derating.

C. VFD manufacturer shall verify compatibility of motor furnished on equipment. One controller shall control the speed of one motor with the exception being a wall fan technology system.

D. VFD shall convert 3 phase, 60 Hz utility power to adjustable voltage and frequency, 3 phase AC power for stepless motor speed control from 10 percent to 100 percent of the motor's 60 Hz speed. Input voltage characteristics are 480 volts, 3 phase, 60 Hz.

E. VFD shall include a converter section. The converter section shall convert fixed frequency and voltage AC utility power to a variable DC voltage. VFD's that use silicon controlled rectifiers in the converter bridge shall also include 5 percent reactors. Isolation transformers are not acceptable in lieu of line reactors.

F. VFD shall include an inverter section. The inverter section shall invert the variable DC voltage into a PWM wave form; adjustable voltage and frequency output for stepless motor speed control.

G. Individual or simultaneous operation of VFD's shall not add more than 5 percent total harmonic voltage distortion and no more than 5 percent total harmonic current distortion (per IEEE 516-1992) to the normal bus.

1. VFD manufacturer shall perform harmonic analysis based on the electrical one-line diagram.

2. The VFD manufacturer shall provide calculations specific to this installation, showing total harmonic voltage distortion is less than 5 percent.

3. Input line filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE Standard 519. All VFD's shall include a minimum of 5 percent impedance reactors, no exceptions.

H. VFD shall include a coordinated AC transient protection system consisting of 4-120 joule rated MOV's (phase to phase and phase to ground), a capacitor clamp, and 5 percent impedance reactors.

I. Harmonics Specification:

1. Input line reactors and DC Bus filtered chokes (factory installed and wired in the drive enclosure) shall be provided to allow reliable operation on a typical commercial power distribution system and to minimize harmonics reflected onto the input line.

a. Shall not interfere with computer and other electronic systems in the building.

b. If not inherently protected, provide a suitable isolation transformer.

c. The system shall not produce spikes on the incoming line.

2. Any inverter that generates sufficient electrical line noise to interfere with operation of sensitive building equipment shall be field modified or replaced by the inverter supplier at no additional cost to the Owner.

J. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product Standard EN 61800-3 for the First Environment restricted level.

K. Low voltage logic and 115V control circuits shall be electrically isolated from the power circuits. Signal circuit common shall be grounded.

L. VFD shall include a power ride-through feature to allow continuous operation up to a three-cycle line loss.

M. Two independently adjustable accel and decel ramps with 1 to 1800 seconds adjustable time ramps. Extended time periods are also acceptable.

N. VFD shall have full function output current limit adjustable from 10 to 100 percent. At the factory with compatible motor, provide at least three lock-out ranges (50 rpm maximum each), two of which can be used to correct any run test problems.

O. Components shall be pretested and complete VFD shall have full burn-in under full load for a minimum of 12 hours. Provide at least three lockout ranges (50 rpm maximum), two of which can be used to correct run test problems.

P. Ambient noise generated by the VFD shall be limited to an amount equal to the system noise level as designated by the latest ASHRAE noise level guidelines for such equipment at each octave band. Noise level criteria at different octave bands and mid-frequencies shall be furnished with the submittal data.

Q. VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and audible motor noise.

R. All VFD to be equipped with integral disconnects.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Approved Manufacturers: Danfoss Graham, ABB, Yaskawa Electric or approved equal.

2.03 ENCLOSURE

A. VFD shall be enclosed in a UL Listed Type 12 enclosure. Enclosure shall be UL listed as a plenum rated VFD. The VFD tolerated voltage window shall allow operation from a line of +30 percent nominal, and -35 percent nominal voltage as a minimum.

B. Environmental operating conditions: 0 to 40 degrees C continuous. VFD's that can operate at 40 degrees C intermittently (during a 24-hour period) are not acceptable and must be oversized. Altitude from 0 to 3300 feet above sea level, less than 95 percent humidity, non-condensing. VFD's without these ratings are not acceptable.

C. The following operator controls shall be located on the front of the enclosure:

1. Bypass Hand-Off-Auto.
2. Drive mode selector.
3. Bypass mode selector.
4. Bypass fault reset.
5. Provide the following indicating lights (LED type). In addition, provide test mode or push to test feature:
    a. Power-on (ready).
    b. Run enable (safeties) open.
    c. Drive mode select damper opening.
    d. Bypass mode selected.
    e. Drive running.
    f. Bypass running.
    g. Drive fault.

h. Bypass fault.

i. Bypass H-O-A mode.

j. Automatic transfer to bypass selected.

k. Safety open.

l. Damper opening.

m. Damper end-switch made.

6. Provide the following relay (form C) outputs from the bypass:

a. System started.

b. System running.

c. Bypass overttide enabled.

d. Drive Fault.

e. Bypass fault (motor overload or underload-broken belt).

f. Bypass H-O-A position.

D. Digital inputs for the system shall accept 24V or 115VAC (selectable).

E. Customer Interlock Terminal Strip: Provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in Hand, Auto, or Bypass modes (not functional in fireman's override 2). The remote start/stop contact shall operate in VFD mode.

F. Dedicated digital input that will transfer motor from VFD mode to bypass mode upon dry contact closure for fireman's override. Two modes of operation are required:

1. The first mode forces the motor to bypass operation and overrides both the VFD and bypass H-O-A switches and forces the motor to operate across the line (test mode). The system will only respond to the digital inputs and motor protections.

2. The second mode operates as the first, but will also defeat the overload and singe-phase protection for bypass and ignore all keypad and digital inputs t the system 9run until destruction).

G. Include a "run permissive circuit" that will provide a normally open contact whenever a run command is provided (local or remote start command in VFD or bypass mode). The VFD system (VFD or bypass) shall not operate the motor until it receives a dry contact closure from a damper or valve end-switch. When the VFD system safety interlock (fire detector, freezestat, high static pressure switch, etc) opens, the motor shall coast to a stop and the run permissive contact shall open, closing the damper or valve.

H. Include Class 20 or 30 (selectable) electronic motor overload protection.

2.04 BYPASS

A. Furnish where indicated on the Drawings, a complete factory wired and tested bypass system consisting of an output contactor and bypass contactor. Overload protection shall be provided in both drive and bypass modes.

B. Bypass to be furnished, built, and mounted by the VFD manufacturer.

C. Provide an internal switch to select manual or automatic bypass.

D. Provide an adjustable current sensing circuit for the bypass to provide loss of load indication (broken belt) when in the bypass mode.

E. Door interlocked, padlockable disconnect that will disconnect all input power from the drive and all internally mounted options.

F. Fused VFD only disconnect (service switch). Fast acting fuses exclusive to the VFD – fast acting fuses allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection, maintaining bypass capability. Bypass designs, which have no such fuses, or that incorporate fuses common to both the VFD and the bypass will not be accepted. The following contactor bypass schemes are not acceptable.

1. Door interlocked main input disconnect switch.

2. Power on light.

3. “Drive-off-bypass” manual mode selector switch.

G. The bypass shall incorporate an internally sourced power supply and shall not require an external power source.

2.05 DISPLAY / KEYPAD

A. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three (3) operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):

1. Output frequency.

2. Motor speed (RPM, percent, or engineering units).

3. Motor current.

4. Calculated motor torque.

5. Calculated motor power (kW).

6. DC bus voltage.

7. Output voltage.

B. Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). The keypad shall use the following assistants:

1. Start-up assistants.

2. Parameter assistants.

3. Maintenance assistant.

4. Troubleshooting assistant.

C. VFD shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. Keypad shall be removable, capable of remote mounting and shall allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFD's.

D. Keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.

E. Provide a built-in time clock with battery back-up in the VFD keypad. The time clock shall be used to date and time stamp faults and record operating parameters at the time of fault. If the battery fails, the VFD shall automatically revert to hours of operation since initial power up. The time clock shall also be programmable to control start/stop functions, constant speeds, PID parameter sets and output relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four (4) separate, independent timer functions that have both weekday and weekend settings.

2.06 SERIAL COMMUNICATION

A. VFD shall have the capability of communicating with the building automation system (BAS) via an RS-485 serial port, requires RJ45 jack.

B. VFD shall be provided with protocol information specific to the selected BAS Provider and shall be pre-configured at the factory to provide automatic communications without the need for field programming and equipped with FLN program P1.

C. VFD shall continue to provide serial communications regardless of how inverter is being controlled ("manual" mode via keypad, "automatic" mode via BAS, or "stopped" mode via either keypad or automatic BAS start/stop signal).

D. Serial communications capabilities shall include, but not be limited to:

1. Run/stop control speed set adjustment.

2. Proportional/integral or PID control adjustments.

3. Current limit.

4. Accel/decel time adjustments.

E. VFD shall have the capability of allowing the BAS to monitor the following feedback signals:

1. Process variable.

2. Output speed/frequency.

3. Current.

4. Torque.

5. Power (kW).

6. Operating hours.

7. Kilowatt hours (kWh).

8. Relay outputs.

9. Diagnostic warning and fault information.

F. VFD shall allow the BAS to control the drive's digital and analog outputs and monitor all drive digital and analog inputs via the serial interface.

G. VFD shall be capable of providing the BAS with status signals for bypass operation and external safety trips via serial interface.

2.07 SYSTEM OPERATION

A. Selector switch in the "off" position: controller run circuit shall be open and the system shall not operate.

B. Selector switch in the "manual" position: motor speed shall be controlled by the manual speed potentiometer.

C. Selector switch in the "auto" position: operation shall be via input 0 to 10 VDC or 4-20 mA signal with strategy output speed proportional to the input signal. If required into the controls strategy, VFD manufacturer shall furnish a pressure transducer mounted in the drive enclosure to convert a 3 to 15 psi pressure signal to a 0 to 10 VDC signal or 4-20 mA signal.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify that surfaces are ready to receive Work.

B. Verify that field measurements are as shown on Shop Drawings and as instructed by manufacturer.

C. Verify that required utilities are available, in the proper location, and ready for use.

3.02 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Power wiring shall be completed by the Electrical Contractor in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

3.03 TESTING

A. Manufacturer shall provide a factory trained technician to inspect, test and start-up the VFD and associated equipment and place the VFD into operation.

B. A harmonic test verifying the distortion level shall be included as part of Start-up and forwarded to the Owner. Any additional equipment, installation and equipment floor space required to meet the distortion level as set forth in the Specification, shall be borne by the VFD manufacturer.

3.04 TRAINING

A. Manufacturer shall provide for and present to the Owner, at no cost to the Owner, a training and troubleshooting course at the Owner's location

1. Provide four (4) hour orientation/start-up operation training for LSU Medical Center Personnel.

END OF SECTION 15172

SECTION 15183 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes refrigerant piping used for air-conditioning applications.

B. Related Sections include the following:

1. Division 15 Section "Hangers and Supports" for pipe supports and installation requirements.

1.3 SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for thermostatic expansion valves, solenoid valves, and pressure-regulating valves.

B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment. Provide on minimum 1/4"=1'-0" scale drawing on 36'x24' sheet with titleblock.

C. Refrigerant piping indicated is schematic only. Manufacturers installation instructions shall take precedence over contract drawings where a conflict may occur. Size piping and design the actual piping layout in accordance with equipment manufacturers instructions and recommendations, including oil traps, double risers, solenoids and other specialties, and pipe and tube sizes, to ensure proper operation and compliance with warranties of connected equipment.

D. Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Welding/Brazing: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX; "Welding and Brazing Qualifications."

B. ASHRAE Standard: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

C. ASME Standard: Comply with ASME B31.5, "Refrigeration Piping."

D. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."

1.5 COORDINATION

A. Coordinate layout and installation of refrigerant piping and suspension system components with other construction, including plumbing and electrical.

B. Coordinate pipe sleeve installations for penetrations in exterior walls.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Refrigerant piping shall be run in Type "L" hard drawn copper tubing attached with wrought copper fittings, utilizing 1000-degree silver solder and a non-corrosive flux. Refrigerant piping shall be sized and installed in strict accordance with the air conditioning unit manufacturer's recommendations and directions and shall be submitted to the Engineer for prior approval before installation. Pressure drops shall not exceed the equivalent of 2-psi. Refrigerant piping system shall be evacuated, charged with refrigerant holding charge. The refrigerant lines to be tested with nitrogen to a test pressure of not less than 450 psi and proved before final charge of refrigerant. Compressor shall not be subject to the 450 psi pressure test.

2.2 VALVES

A. Provide valves as recommended by equipment manufacturer.

2.3 REFRIGERANT PIPING SPECIALITIES

A. Provide refrigerant piping specialties as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Aboveground, within Building and Exterior: drawn-copper tubing.

3.2 VALVE APPLICATIONS

A. Install a full-sized, three-valve bypass around each dryer.

B. Install thermostatic expansion valves as close as possible to evaporator.

C. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.

3.3 SPECIALTY APPLICATIONS

A. Install moisture-liquid indicators in liquid lines between filter-dryers and thermostatic expansion valves and in liquid line to receiver.

B. Install permanent filter-dryers before each solenoid valve.

C. Install solenoid valves in liquid line of systems operating with single pump-out or pump-down compressor control.

D. Install receivers, sized to accommodate pump-down charge, on systems and larger and on systems

with long piping runs.

3.4 PIPING INSTALLATION

A. Install refrigerant piping according to ASHRAE 15.

B. Install refrigerant piping as recommended by the HVAC equipment manufacturer. Include liquid line solenoid, sight glass, filter drier, and thermostatic expansion valve (TXV) with by-pass and check valve assembly around TXV to allow liquid flow from the indoor unit coil to the outdoor unit during the heating mode.

C. Basic piping installation requirements are specified in Division 15 Section "Basic Mechanical Materials and Methods."

D. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

E. Arrange piping to allow inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.

F. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through walls or ceilings, sized to permit installation of full-thickness insulation.

G. Belowground, install copper tubing in protective conduit. Vent conduit outdoors.

H. Slope refrigerant piping as follows:

1. Install horizontal suction lines with a uniform slope downward to compressor.
2. Liquid lines may be installed level.

I. Manufacturers installation instructions shall supercede contract drawings where a conflict may occur. Notify Architect before proceeding if a conflict does occur.

J. Install unions to allow removal of solenoid valves, pressure-regulating valves, and expansion valves and at connections to compressors and evaporators.

K. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion valve bulb.

L. Hanger, support, and anchor products are specified in Division 15 Section "Hangers and Supports."

M. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than long.
2. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

3.5 PIPE JOINT CONSTRUCTION

A. Braze joints according to Division 15 Section "Basic Mechanical Materials and Methods."
B. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent scale formation.

3.6 FIELD QUALITY CONTROL

A. Test and inspect refrigerant piping according to ASME B31.5, Chapter VI.

B. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure.

3.7 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of the conditioned air to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Check compressor oil level above center of sight glass.
2. Open compressor suction and discharge valves.
3. Open refrigerant valves, except bypass valves that are used for other purposes.
4. Check compressor-motor alignment, and lubricate motors and bearings.

3.8 CLEANING

A. Before installing copper tubing other than Type ACR, clean tubing and fittings with trichloroethylene.

B. Replace core of filter-dryer after system has been adjusted and design flow rates and pressures are established.

3.9 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter-dryer after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to a vacuum of . If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to .
4. Charge system with a new filter-dryer core in charging line. Provide full-operating charge.
5. Provide to mechanical engineer, on contractors letterhead, the amount of refrigerant provided on a per system basis.

END OF SECTION

SECTION 15190 – PIPING AND EQUIPMENT IDENTIFICATION

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install Owner's equipment tags, fire damper tags, valve tags, stencils, and pipe markers indicated by the Contract Documents with supplementary items necessary for proper installation.

B. Contractor shall make it possible for Owner's operations and maintenance personnel to readily identify the various pieces of equipment, valves, piping, ductwork, fire dampers etc., by marking them in accordance with this Specification.

C. Clearly mark all items of equipment, including but not limited to, fans, pumps, fire dampers, and valves using equipment tags as specified in this Section. The tagged item of equipment shall correspond to the same number as shown on the drawings.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and Workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. ASME A13.1 - Scheme for the Identification of Piping Systems.

2. NFPA 99 – Standard for Health Care Facilities.

3. NFPA 13 – Installation of Sprinkler Systems.

4. NFPA 14 – Installation of standpipe and Hose Systems.

5. International Plumbing Code 2015.

1.04 SUBMITTALS

A. Product Data:

1. Provide manufacturer's catalog literature for each product.

B. Record Documents:

1. Submit Equipment Matrix with Valve and Fire Damper schedules completed..xlsx

C. Operation and Maintenance Data:

1. Manufacturer's Installation Instructions: Indicate special procedures and installation.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

C. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

2.02 MANUFACTURERS

A. Equipment Tags, Valve Tags, and Markers:

1. Marking Systems, Inc.

2. Seton Name Plate Company.

3. W.H. Brady Company.

4. Graphic Products, Inc.

2.03 EQUIPMENT AND FIRE DAMPER TAGS

A. Description: 3" x 4" vinyl label, 3.0 Mil self-adhesive vinyl similar to DuraLabel Pro. Label color shall be white text on a black background..

2.04 VALVE TAGS

A. Valve tags shall conform to ANSI A13.1-1981 "Scheme for the Identification of Piping Systems", refer to Table A (end of section) for abbreviation, and label color designations.

B. Valve tags shall be black ABS plastic tags: Injected molded ABS plastic, 3.375” X 4.75” with self-adhesive vinyl label, similar to DuraLabel Pro, affixed to valve tag. Each tag shall be attached to its valve with one tie strap.

C. Vinyl Label: 3.0 Mil self-adhesive vinyl similar to DuraLabel Pro

D. In addition to valve tags, valves at water headers and steam PRV stations, valves associated with condensate, gas, water meters, and other valves as specified shall be tagged with standardized color coded plastic tags. Each tag shall be attached to its valve with one tie strap. These tags shall be 2-½ inches wide by 1-½ inches high with these color codings:

1. Red = normally closed.

2. Green = normally open..

E. Valve Tag Fasteners: Single ABS plastic tie strap.

2.05 PIPE AND DUCT MARKERS

A. Round Pipe and Duct Markers shall conform to ANSI A13.1-2007 "Scheme for the Identification of Piping Systems", refer to Table A for abbreviation and label color designations. Arrow markers must have same ANSI background colors as their companion pipe markers, or be incorporated into the pipe identification marker.

B. Rectangular Duct Stencils shall conform to ANSI A13.1-2007 "Scheme for the Identification of Piping Systems". Letter height shall be a minimum of 1-1/4”. Stencil material shall be fiber board; Stencil paint shall be exterior, gloss, acrylic enamel. The following rectangular duct systems shall be stenciled:

1. Biosafety Cabinet Exhaust.

C. Plastic Pipe Markers (all piping, domestic water, etc.): Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Heat sealed or heat shrink, spring fasteners, clips or snap-on are acceptable.

E. Underground Plastic Pipe markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

F. All medical gas piping shall have minimum information per NFPA 99, plus operating pressure.

G. Pipe markers and arrow markers also shall be provided for all piping systems.

H. Use Seton Setmark Type SNA or Brady snap-on type identification for all piping systems, up through 6 inch. For piping systems larger than 6 inches, use Seton or Brady strap-on markers or similar by Marking Services, Inc.

2.06 CEILING GRID TAG FOR EQUIPMENT LOCATED ABOVE LAY-IN CEILING

A. Description: 3/4" x variable length" vinyl label, 3.0 Mil self-adhesive vinyl similar to Dura Label Pro. Label color shall be black text on a white background. The label shall identify the following:

   1. Exhaust and supply valves

   2. VAV Boxes

   3. Valves above the ceiling

B. All scheduled equipment above finish lay-in ceiling shall be identified with an Equipment Tag.

C. All ceiling grid tags shall be installed prior to the ceiling cover inspection.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Install plastic tape, and pipe markers completely around pipe in accordance with manufacturer's instructions.

D. Locate markers on the two (2) lower quarters of the pipe where view is unobstructed.

3.02 VALVE TAGS

A. Contractor(s) shall provide and install valve tags on all valves installed within this Project, except check valves; valves within fabricated equipment units; faucets; hose connections; needle valves; gauge cocks; HVAC terminal devices and similar roughing-in connections of end-use fixtures and units.

B. Existing valve tags shall not be attached to new valves. When removing and/or replacing existing tagged valves, give the Owner all existing tags that are attached to the valves that are removed. New tags with new asset numbers shall be provided for new valves.

3.03 APPLICATION OF MARKERS AND STENCILS

A. Piping runs throughout the Project including those above lift-out ceilings, under floor and those exposed to view when access doors or access panels are opened shall be identified by means of pipe markers and/or stencils. Concealed areas, for purposes of this identification section, are those areas that cannot be seen except by demolition of the building elements. In addition to pipe markers and/or stencils, arrow markers shall be used to indicate direction of flow.

B. As a minimum, locate pipe markers and/or stencils as follows:

1. Provide a pipe marker at each valve to indicate proper identification of pipe contents. Where several valves exist on one (1) header, it is necessary to mark only the header.

2. Every 20 feet in exposed and concealed areas on all piping systems. Provide at least one (1) pipe marker in each room on all piping systems (both HVAC and Plumbing Systems).

3. At each branch or riser take off on piping systems, excluding short takeoffs for fixtures and terminal units.

4. Provide a pipe marker or stencil and an arrow marker at every point of pipe entry or exit where the pipe penetrates a wall, floor, service column or enclosure.

5. At access doors, manholes and similar access points that permit view of concealed piping.

6. Near major equipment items and other points of origination and termination.

C. Provide an arrow marker with each pipe marker pointing away from the pipe marker to indicate direction of flow.

D. Provide a double-ended arrow marker when flow can be in either or both directions.

E. Indicate delivered water temperature on domestic hot water supply and return lines.

F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

G. Identify control panels and major control components outside panels with plastic nameplates.

H. Identify valves in main and branch piping with tags.

I. Tag automatic controls, instruments and relays. Key to control schematic.

J. Provide ceiling grid tags to locate valves, fan coil units, dampers or other concealed equipment above T-bar type panel ceilings. Locate in corner of grid closest to equipment.

K. Identify pipe utilizing copper press fittings with markers stating, “Press-Fit” adjacent to each content identification marker.

L. Identify medium pressure gas piping (14 inches water column to 5psi) with the statement, "WARNING – ½ to 5psi NATURAL GAS".

M. Identify right and left nipple and coupling union assemblies with the statement "Right/Left Nipple/Coupling".

TABLE A: Mechanical/Plumbing Piping System Abbreviations and Letter/Label Coloring

Pipe Contents	Label Abbreviation	Label Colors (Background/Text)
Chilled Water Return	CHWR	Green/White
Chilled Water Supply	CHWS	Green/White
Fire Suppression Water	FIRE	Red/White
Hot Water Heating Return	HWR	Green/White
Hot Water Heating Supply	HWS	Green/White
Potable Cold Water	DCW	Green/White
Potable Hot Water Return	DHWR	Green/White
Potable Hot Water Supply	DHW	Green/White

END OF SECTION

SECTION 15260 – PIPING INSULATION

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install piping insulation, jackets and accessories indicated by the Contract Documents with supplementary items necessary for proper installation.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and Workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
2. ASTM C168 - Terminology Relating to Thermal Insulation Materials.
3. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded- Hot-Plate Apparatus.
4. ASTM C195 - Mineral Fiber Thermal Insulating Cement.
5. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
6. ASTM C449 - Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
7. ASTM C518 - Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
8. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
9. ASTM C547 - Mineral Fiber Pipe Insulation.
10. ASTM C552 - Cellular Glass Thermal Insulation.
11. ASTM C578 - Rigid, Cellular Polystyrene Thermal Insulation.

12. ASTM C585 - Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).

13. ASTM C591 - Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

14. ASTM C610 - Molded Expanded Perlite Block and Pipe Thermal Insulation.

15. ASTM C921 - Jackets for Thermal Insulation.

16. ASTM C1126 - Faced or Unfaced Rigid Celluar Phenolic Thermal Insulation.

17. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

18. ASTM D1667 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed Cell Foam).

19. ASTM D2842 - Water Absorption of Rigid Cellular Plastics.

20. ASTM C795 - Insulation For Use Over Austenitic Steel.

21. ASTM E84 - Surface Burning Characteristics of Building Materials.

22. ASTM E96 - Water Vapor Transmission of Materials.

23. NFPA 255 - Surface Burning Characteristics of Building Materials.

24. UL 723 - Surface Burning Characteristics of Building Materials.

25. ASTM D5590 - Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay

1.04 DEFINITIONS

A. Concealed: Areas that cannot be seen by the building occupants.

B. Interior Exposed: Areas that are exposed to view by the building occupants, including underneath countertops, inside cabinets and closets, and all equipment rooms.

C. Interior: Areas inside the building exterior envelope that are not exposed to the outdoors.

D. Exterior: Areas outside the building exterior envelope that are exposed to the outdoors, including building crawl spaces and loading dock areas.

1.05 QUALITY ASSURANCE

A. All piping requiring insulation shall be insulated as specified herein and as required for a complete system. In each case, the insulation shall be equivalent to that specified and materials applied and finished as described in these Specifications.

B. All insulation, jacket, adhesives, mastics, sealers, etc., utilized in the fabrication of these systems shall meet NFPA for fire resistant ratings (maximum of 25 flame spread and 50 smoke developed ratings) and shall be approved by the insulation manufacturer for guaranteed performances when incorporated into their insulation system, unless a specific product is specified for a specific application and is stated as an exception to this requirement.

1. Certificates to this effect shall be submitted along with Contractor's submittal data for this Section of the Specifications.

2. No material shall be used that, when tested by the ASTM E84-89 test method, is found to melt, drip or delaminate to such a degree that the continuity of the flame front is destroyed, thereby resulting in an artificially low flame spread rating.

C. Application Company Qualifications: Company performing the Work of this Section shall have minimum three (3) years experience specializing in the trade.

D. All insulation shall be applied by mechanics skilled in this particular Work and regularly engaged in such occupation.

E. All insulation shall be applied in strict accordance with these Specifications and with factory printed recommendations on items not herein mentioned. Unsightly, inadequate, or sloppy Work will not be acceptable.

1.06 SUBMITTALS

A. Product Data:

1. Provide product description, list of materials, "k" value, "R" value, mean temperature range, and thickness for each service and location.

2. Samples: When requested, submit three (3) samples of any representative size illustrating each insulation type

B. Operation and Maintenance Data:

1. Indicate procedures that ensure acceptable standards will be achieved. Submit certificates to this effect.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project Site in original factory packaging, labeled with manufacturer's identification including product thermal ratings and thickness.

B. Store insulation in original wrapping and protect from weather and construction traffic. Protect insulation against dirt, water, chemical, and mechanical damage.

C. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulation cements.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are

made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Insulation:

1. Owens-Corning (Type P1).
2. Certainteed Corporation (Type P1).
3. Johns Manville Corporation (Type P1).
4. Knauf Corporation (Type P1).
5. Dow Chemical Company (Type P2).
6. Armstrong/Armacell (Armaflex) (Type P3).
7. RBX Industries/Rubatex (Type P3).
8. Industrial Insulation Group, LLC (Type P4).
9. Resolco International by (Insul-Phen) (Type P5).
10. FOAMGLAS (Cellular Glass) by Pittsburgh Corning (Type P6).

D. Jackets:

1. Childers Products Company
2. PABCO
3. RPR Products, Inc.
4. Venture Clad Corporation
5. Foster Vapor Fas 62-05
6. Foamglas

E. Coatings, Sealants, and Adhesives:

1. Foster
2. Childers

2.03 INSULATION

A. Type P1: Fiberglass preformed insulation; ASTM C 547; minimum 3.0 lb/cu ft density, ASTM C335,'k' value of 0.23 at 75 degrees F; noncombustible.

B. Type P2: Molded closed cell polyisocyanurate insulation; ASTM E96, maximum water vapor transmission rating of 0.005 Perm-In; ASTM C518, 'k' value of 0.20 at 75 degrees F; ASTM D2842, water absorption value of 0.05 lb/ft2.

C. Type P3: Closed cell elastomeric, flexible, insulation; ASTM E96; maximum vapor transmission rating of 0.20 perms; ASTM C 518; 'k' value of 0.27 at 75 degrees F.

D. Type P4: Mineral Wool; ASTM C 547; preformed, high temperature insulation; 'k' value of 0.35 at 300 degrees F.

E. Type P5: Phenolic closed cell, ASTM C1126 rigid foam, 2.2 lbs. nominal density, CFC free; ASTM C518, 'k' value of 0.13 at 75 degrees F. (Note material thickness limit is 3 inches as tested in accordance with ASTM E84).

F. Type P5A: Phenolic closed cell insulation; ASTM E96, maximum water vapor transmission rating of 0.02 Perm-In; ASTM C1126 rigid foam, 3.75 lbs. nominal density, CFC free; ASTM C518, 'k' value of 0.16 at 75 degrees F. (Note material thickness limit is 3 inches as tested in accordance with ASTM E84).

G. Type P5B: Phenolic closed cell insulation; ASTM E96, maximum water vapor transmission rating of 0.02 Perm-In; ASTM C1126 rigid foam, 5.0 lbs. nominal density, CFC free; ASTM C518, 'k' value of 0.21 at 75 degrees F. (Note material thickness limit is 3 inches as tested in accordance with ASTM E84).

H. Type P6: Cellular Glass, ASTM C552, 7.5 lbs./cu.ft, density, ASTM E96 (Wet Cup Method) 0.00 water vapor perm , ASTM C518 'k' value of 0.29 at 75 degrees F.

2.04 JACKETS

A. Factory Applied Jackets:

1. White kraft bonded to reinforced foil vapor barrier with self-sealing adhesive joints.

2. ASJ White, triple-ply laminate polypropylene, mold resistant, metalized polyester vapor barrier film backing: Venture 1555U or Insulrap 30 Vapor Barrier I-30.

B. Field Applied Jackets:

1. PVC Jackets (color coded): UL listed 25/50 rated per ASTM E 84, UV resistant, minimum insulation thickness 0.020 inches for pipe outside diameters up to 18 inches and 0.030 inches for pipe outside diameters 18 inches and above. Standard manufactured PVC cover fittings cover system consisting of one-piece, pre-molded, PVC covers with fiberglass inserts manufactured from 20-mils thick, high-impact, ultraviolet-resistant. Use ultraviolet resistant adhesive as recommended by the manufacturer.

2. Reinforcing Mesh: Glass Fiber Childers Chil-Glas #10 or synthetic 9X8 mesh with minimum weight of 0.9 ounces per square yard.

3. Aluminum Jackets: ASTM B 209; 0.020 inch thick; smooth finish with factory applied moisture barrier.

4. Stainless Steel Jackets: Type 304 stainless steel; 0.010 inch thick; smooth finish.

5. VentureClad 1577CW or Foster Vapor Fas 62-05, zero permeability and mold resistant jacket material, 5-ply laminate with 5-6 mil film with adhesive on one side. Jacketing laminated film must have UV coating for additional exterior protection. Product shall be used with phenolic closed cell insulation where Type 5A and 5B insulation is installed on existing chilled water piping being repaired or being modified.

2.05 COATINGS, SEALANTS, AND ADHESIVES

A. Insulating Cement: ASTM C 195; hydraulic setting mineral wool; Ryder One-Coat.

B. Sealants: Foster 95-50; Childers CP-70 or CP-76

1. Apply at valves, fittings and where insulation is terminated. Brush-apply sealant to end of insulation and continue along pipe surface.

2. Below-ambient closed cell pipe insulation (Type P5, P5A, P5B): apply sealant on all longitudinal and butt insulation joints to prevent moisture transmission.

C. Adhesives: Use to adhere the longitudinal lap seam of vapor barrier jackets and at butt joints between insulation or fitting covers. Provide Childers CP-82 or Foster 85-20/85-60 as general purpose adhesive. For use with calcium silicate or expanded perlite insulation, use Childers CP-97 or Foster 81-27 fibrous adhesive when adhering pipe saddles and shields to the insulation.

D. Primers: For proper bonding with lagging adhesive/canvas provide light coat of Childers CP-50 AMV1 or Foster 30-36 diluted 50 percent with water over insulation or Pittcoat 300 primer thinned with mineral spirits to cover insulating cements prior to finish coating.

E. Coatings and Mastics:

1. Vapor barrier coating for indoor, below-ambient applications: Foster 30-80 or Childers CP-38 on all elbows, fittings, and valves. Coating shall adhere to MIL-C-19565C, Type II and shall be QPL listed.

2. Weather barrier/breather mastics for above-ambient piping applications: Childers CP-10/CP-11 or Foster 46-50.

3. High humidity applications: Foster 30-80 AF or Childers CP-137 AF fungus/mold resistant coating that meets ASTM D 5590 with zero growth rating.

4. Exterior applications: Childers CP 30LO (must be covered by metal jacketing), Childers CP-45 Encacel V, or Foster 60-95 Monolar for insulated elbows/fittings, longitudinal seams, and butt joints of vapor barrier jackets or glass cloth jackets.

5. Finish coat over closed cell elastomeric: Foster 30-64 or Armstrong "Finish" acrylic finish.

6. Canvas Finishes:

a. Apply lagging adhesive to prevent mildew for securing canvas. Apply anti-fungal lagging adhesive that adheres to ASTM D 5590 with zero growth rating. (Foster 30-36AF, Childers CP-137AF) Do not use wheat paste.

b. Exterior Applications: cover all canvas insulation with a fire-retardant weather barrier mastic. On canvas jacketed systems where seam joints at fittings are rough, cover with an application of insulating cement and smooth with a trowel before the canvas is applied with adhesive. Canvas shall be free of wrinkles and have a smooth, neat appearance.

F. Reinforcing Mesh: Childers Chil-Glas #10 or Foster Mast-a-Fab 9x8 reinforcing mesh with coatings and mastics.

G. Lagging Adhesives/Coatings: Childers CP-50A HV2 or Foster 30-36 for adhering canvas and glass cloths over thermal insulation installed indoors. Adhesive shall adhere to MIL-A-3316C Class I, Grade A.

a. High humidity applications (unconditioned space): Foster 30-36 AF or Childers CP-137 AF fungus/mold resistant coating that meets ASTM D 5590 with zero growth rating. Coating shall adhere to MIL-C-19565C, Type II and must be QPL listed.

2.06 APPLICATIONS

A. Interior Concealed Applications (Plenums, Chases):

1. Type P1 Insulation: Provide factory applied ASJ white kraft foil vapor barrier.

a. Below-ambient piping: Coat all ASJ seams with Foster 30-80 or Childers CP-38 vapor barrier coating. Coat all elbows, fittings, and valves with same vapor barrier coating and Foster Mast-a-Fab or Childers Chil-Glas #10 reinforcing mesh.

b. High humidity applications: Foster 30-36 AF.

2. Type P3 Insulation: Finish coat is not required.

3. Type P4 Insulation: Lightly coat insulation with lagging adhesive diluted 50% with water for proper bonding with canvas/lagging adhesive. Cover with a canvas jacket and non-diluted Childers CP-50A HV2 or Foster 30-36 lagging adhesive.

a. High humidity applications (unconditioned space): Foster 30-36 AF or Childers CP-137 AF fungus/mold resistant coating.

4. Type P5 and P5A, 5B Insulation: VentureClad jacket on piping where condensation can occur or where installed on existing chilled water piping, chilled water condensate drain piping, and roof storm drain piping that transports cold rain water from the building roof.

5. Type P5 Jacket not required when insulation is used on hot water piping.

6. Type P6 Insulation:

a. Above-ambient piping: Pittcoat 404, Foster 46-50, or Childers CP-10/11 pre-molded PVC covers per manufacturer's recommendations. Jacket is not required when this type of piping insulation is concealed within a piping chase.

b. Below-ambient piping: Coat all ASJ seams with Foster 30-80 or Childers CP-38 vapor barrier coating. Coat all elbows, fittings, and valves with same vapor barrier coating and Foster Mast-a-Fab or Childers Chil-Glas #10 reinforcing mesh.

c. High humidity applications (unconditioned space): Foster 30-36 AF or Childers CP-137 AF fungus/mold resistant coating.

B. Interior Exposed Applications (Equipment Rooms):

1. Type P1 and P2 Insulation: Factory applied ASJ white kraft foil vapor barrier. Finish with colored PVC jacket. Verify jacket is suitable for applications.

a. High humidity applications (unconditioned space): Foster 30-36 AF or Childers CP-137 AF fungus/mold resistant coating. Finish coat is not required.

2. Type P3 Insulation: Finish coat is not required.

3. Type P4 Insulation: Lightly coat insulation with lagging adhesive diluted 50% with water for proper bonding with canvas/lagging adhesive. Cover with a canvas jacket and non-diluted Childers CP-50A HV2 or Foster 30-60 lagging adhesive.

    a. High humidity applications (unconditioned space): Foster 30-36 AF or Childers CP-137 AF fungus/mold resistant coating. Finish coat is not required.

4. Type P5 Insulation: Factory applied ASJ white kraft foil vapor barrier.

5. Type P5 and P5A Insulation: VentureClad jacket on piping where condensation can occur or where installed on existing chilled water piping, chilled water condensate drain piping, and roof storm drain piping that transports cold rain water from the building roof.

6. Type P6 Insulation: Provide triple-ply laminate polypropylene, mold resistant with a metal foil and polyester vapor barrier film backing.

    a. Below-ambient piping: Coat all ASJ seams with Foster 30-80 or Childers CP-38 vapor barrier coating. Coat all elbows, fittings, and valves with same vapor barrier coating and Foster Mast-a-Fab or Childers Chil-Glas #10 reinforcing mesh.

    b. Above-ambient piping: Provide Pittcoat 404, Foster 46-50, or Childers CP-10/11 or pre-molded PVC covers per manufacturer's recommendations.

    c. High humidity applications (unconditioned space): Foster 30-36 AF or Childers CP-137 AF fungus/mold resistant coating.

7. All exposed insulated piping within six (6) feet of the floor shall be protected with aluminum or stainless steel jacket to protect insulation from being torn or punctured. All other exposed piping for all type insulation shall also be covered in a colored PCV jacket, color to be approved by Engineer.

C. Exterior Applications:

1. Insulate piping system as indicated under Interior Exposed Applications, prior to final jacket installation.

2. Provide electric heat tracing for all exterior small bore piping 2 inches and smaller where water may be susceptible to freezing due to intermittent flow conditions.

3. Final jacket cover shall be aluminum or stainless steel having integral moisture barrier with seams located at 2 or 10 o'clock position of horizontal piping. All laps shall be minimum 2 inches. Apply Foster 95-44 or Childers CP-76 metal jacketing sealant on all laps to prevent water transmission.

4. Type P1 Insulation: For above-ambient piping, finish with Childers Chil-Glas #10 or 9X8 reinforcing mesh and Childers CP-10/CP-11, or Foster 46-50 weather barrier/breather mastic, prior to final jacket installation.

5. P6 Insulation Above-ground: Provide (50 mil thickness) self-sealing non- metallic, bituminous compound reinforced with glass fiber membrane with 1 mil aluminum top film jacketing for both chilled water and hot water piping (PITTWRAP CW Plus). Provide metal jacketi where material is exposed to ultraviolet rays.

6. P6 Insulation Underground: Provide factory applied (50 mil thicknesses) self-sealing membrane bituminous compound reinforce with glass fiber for chilled water piping (PITTWRAP IW 50 or Foster C.I. Wrap 50mil). Metal jacket not required for buried pipe.

2.07 INSERTS, SUPPORTS AND SHIELDS

A. Application: Piping ½ inch diameter or larger for all systems except direct buried.

B. Shields shall be made of galvanized steel or made of black iron painted on both sides with a minimum two coats of aluminum paint. Required metal shield sizes are as follows:

Nominal IPS (inches)	Metal Thickness (gage)	Minimum Lengths of Shield (inches)
½ to 1½	18	12
2	14	12
2-½ to 6	12	16
8 and above	10	20

C. Inserts for shields shall be manufactured of 7.5 lb/cu. ft. density cellular glass or 5.0 lb/cu. ft. density cellular, phenolic insulating material suitable for the planned temperature range. Provide factory fabricated inserts with integral galvanized pipe saddles. Inserts shall be the same thickness as the adjacent insulation.

D. Depending on the type of pipe support design, stainless steel bands or aluminum bands may be required to keep shield material next to the jacketing material.

1. Insulation Bands: 3/4 inch wide; 0.007 inch thick galvanized steel when exposed to interior environment, 0.010 inch thick stainless steel or 0.015 inch thick aluminum when exposed to humid interior environment or outside environment.

2. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum or 0.010 inch thick stainless steel to match jacket.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify that piping has been inspected at the welds and pressure tested before applying paint and insulation materials.

B. Thoroughly clean all surfaces to be insulated as required to remove all oil, grease, loose scale, rust, and foreign matter. Piping shall be completely dry at the time of application of primer paint. Painting on piping where condensation is occurring on the pipe surface is strictly prohibited.

C. Provide primer coat on all steel piping field welds. Painting shall be completed and approved prior to installation of insulation. Paint shall be applied in accordance with the paint manufacturer's instructions, environment, and pipe surface temperatures.

3.02 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. Installation of insulation and jacket materials shall be in accordance with manufacturer's published instructions.

C. Handle and install materials in accordance with manufacturer's instructions in the absence of specific instructions herein.

D. On exposed piping, locate insulation cover seams with the ridge of the lap joint is directed down. All exposed piping (mechanical rooms) shall be covered in colored PVC jackets, color to match LSU Medical Center color pattern.

E. Exposed Insulated piping within six feet of the floor shall be protected with an aluminum or stainless jacket material to protect the insulation.

F. Insulate fittings, joints and valves with molded insulation of the same material and thickness as adjoining pipe. Open voids and cracks insulation shall be kept at a minimum when placing insulation on abnormal or irregular shapes. Use closed cell or recommended fill material as instructed by the insulation manufacturer to close openings. Fiberglass insulation shall not be used as a fill material on chilled water piping or fittings. Vapor seal all cold piping ASJ seams and elbows/fittings with vapor barrier coating and reinforcing mesh.

G. Continue insulation through walls, sleeves, pipe hangers, floors, and other pipe penetrations.

H. Provide dams in insulation at intervals not to exceed 20 feet on cold piping systems to prevent migration of condensation or fluid leaks. Indicate visually where the dams are located for maintenance personnel to identify and also provide dams at butt joints of insulation at fittings, flanges, valves, and hangers.

I. Insulate entire system including fittings, valves, flanges and strainers. Use closed cell insulation on cold piping system flexible connections, expansion joints and unions, bevel and seal ends of insulation and continue sealant or coating a minimum of 4 inches along the piping, unless stated otherwise. On all closed-cell insulation, cold piping, use insulation joint sealant on all longitudinal and butt joints.

J. For hot piping conveying fluids 180 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation. Continue sealant or coating a minimum of 4 inches along the piping.

K. On heating piping systems conveying fluids over 180 degrees F with unions, flanges, valves, strainers and equipment that are anticipated to be removed for maintenance, the insulation shall terminate (beveled to pipe) just prior to the flange or union with vapor barrier sealed to pipe. The tapered segment of insulation shall not interfere with the removal of unions flange bolts or equipment. The unions, flanges, valves and strainers shall be insulated with removable insulated covers with toggle catches or Velcro straps

L. All sections of molded pipe covering shall be firmly butted together. Where an insulation covering is applied, it shall lap the adjoining section of insulation by at least three inches (3 inches). Where insulation terminates, it shall be neatly beveled and finished. All materials used shall be fire retardant or nonflammable.

M. Where vapor barriers are required, the vapor barrier shall be on the outside. Extreme care shall be taken that the vapor barrier is unbroken. Joints, etc., shall be sealed with vapor barrier coating. Where insulation with a vapor barrier terminates, seal off with vapor barrier continuous to the surface being insulated. Ends shall not be left raw.

N. Where pipe chases are tight, adequate provision shall be made at the rough-in stage using offset fittings or other means (except springing the pipe) to ensure that insulation can be applied throughout the length of the pipe.

O. When installing phenolic insulation provide a 5 lb. density insert of same thickness and contour as adjoining 3.75 lb. density insulation, between the support shield and piping, and under the finish jacket, on piping 1½ inch diameter or larger, to prevent insulation from sagging at support points. Provide inserts for 180-degree arc and not less than 2 inches more than the length of the pipe support shield or minimum 12 inches long (whichever is greater). Pipe support shield shall be adhered to insulation with a UL approved adhesive that meets E-84 requirements.

P. Seal all insulation at supports, protrusions and interruptions. Maintain vapor barrier with finish coat.

Q. Shields:

1. Install between pipe hangers or pipe hanger rolls and inserts. Curved metal shields shall be used between the hangers or support points and at the bottom of insulated pipe.

2. Hangers shall support the load of the insulated pipe section on the outside of the insulation and shall not be in direct contact with the pipe.

3. Manufacturer shall be responsible to size the length of shield required to prevent insulation from breaking.

4. Provide rigid insulation at each support point, a minimum of 2 inches longer than shield length.

5. Curved metal shields shall be designed to limit the bearing stress on the insulation to 35 psi and shall be curved to fit up to mid-perimeter of the insulated pipe.

3.03 PIPING INSULATION APPLICATION AND THICKNESS SCHEDULE

A. In no case shall installed piping insulation have insulation thicknesses that are less than what is required by local energy codes and ASHRAE 90.1 (whichever is more stringent), based on comparable insulation conductivity values at the specified mean rating temperature.

B. Type 5A and 5B insulation is only used where it is being replaced on existing pipe and thickness of the replacement insulation shall match the existing insulation thickness.

Piping Systems	Location	Type	Pipe Size	Insulation Thickness
Domestic Cold Water, Hot Water Supply and Return Lines	Interior Concealed	P1	1-1/2" & Smaller	1/2”
			2" to 4"	1/2”
			6" & Larger	1/2”
Floor Drain Bodies and related horizontal Sanitary Drain Lines above floor that receive cold condensate drainage.	Interior Concealed	P1	2” & Smaller	1/2"
			2-1/2”& Larger	1”
Refrigerant Suction Lines	All	P3	2-1/2” and Smaller	1/2"

END OF SECTION

SECTION 15290 – DUCTWORK INSULATION

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install ductwork insulation and jackets indicated by the Contract Documents with supplementary items necessary for proper installation.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
2. ASTM C168 - Terminology Relating to Thermal Insulation Materials.
3. ASTM C518 - Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
4. ASTM C553 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
5. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.
6. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
7. ASTM C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
8. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
9. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
10. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

11. ASTM E84 - Surface Burning Characteristics of Building Materials.

12. ASTM E96 - Water Vapor Transmission of Materials.

13. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

14. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

15. NFPA 255 - Surface Burning Characteristics of Building Materials.

16. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

17. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.

18. UL 723 - Surface Burning Characteristics of Building Materials.

19. ASTM E2336 - Standard for Grease Ducts.

20. ASTM D5590 - - Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay

1.04 QUALITY ASSURANCE

A. All ductwork requiring insulation shall be insulated as specified herein and as required for a complete system. In each case, the insulation shall be equivalent to that specified and materials applied and finished as described in these Specifications.

B. All insulation, jacket, adhesives, mastics, sealers, etc., utilized in the fabrication of these systems shall meet NFPA for fire resistant ratings (maximum of 25 flame spread and 50 smoke developed ratings) and shall be approved by the insulation manufacturer for guaranteed performances when incorporated into their insulation system, unless a specific product is specified for a specific application and is stated as an exception to this requirement. Certificates to this effect shall be submitted along with Contractor's submittal data for this Section of the Specifications. No material may be used that, when tested by the ASTM E84-89 test method, is found to melt, drip or delaminate to such a degree that the continuity of the flame front is destroyed, thereby resulting in an artificially low flame spread rating.

C. Application Company Qualifications: Company performing the Work of this Section must have minimum three (3) years experience specializing in the trade.

D. All insulation shall be applied by mechanics skilled in this particular Work and regularly engaged in such occupation.

E. All insulation shall be applied in strict accordance with these Specifications and with factory printed recommendations on items not herein mentioned. Unsightly, inadequate, or sloppy Work will not be acceptable.

1.05 SUBMITTALS

A. Product Data:

1. Provide product description, list of materials, “k” value, “R” value, mean temperature range, and thickness for each service and location.

B. Record Documents:

1. Submit under provisions of Division 01.

C. Operation and Maintenance Data:

1. Samples: When requested, submit three (3) samples of any representative size illustrating each insulation type.

2. Manufacturer’s Installation Instructions: Indicate procedures that ensure acceptable standards will be achieved. Submit certificates to this effect.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products to the Project Site under provisions of Division 01.

B. Deliver materials to Site in original factory packaging, labeled with manufacturer’s identification including product thermal ratings and thickness.

C. Store insulation in original wrapping and protect from weather and construction traffic. Protect insulation against dirt, water, chemical, and mechanical damage.

D. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulation cements.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer’s model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Approved manufacturers:

1. CertainTeed Corporation.

2. Johns Manville Corporation.

3. Knauf Corporation.

4. Owens-Corning.

5. Armacell North America.

6. Unifrax 1 LLC. (FyreWrap)

7. 3M Fire Protection Products (Fire Barrier Duct Wrap 615+)

2.03 INSULATION MATERIALS

A. Type D1: Flexible glass fiber; ASTM C553 and ASTM C1290; commercial grade; 'k' value of 0.25 at 75 degrees F; 1.5 lb/cu ft minimum density; 0.002 inch foil scrim kraft facing for air ducts.

B. Type D2: Rigid glass fiber; ASTM C612, Class 1; 'k' value of 0.23 at 75 degrees F; 3.0 lb/cu ft minimum density; 0.002 inch foil scrim kraft facing for air ducts.

C. Type D3: Ductliner (to be used in return air sound boots only), flexible glass fiber; ASTM C1071; Type II, ‘k’ value of 0.23 at 75 degrees F; 3.0 lb/cu ft minimum density; coating air side for maximum 4,000 feet per minute air velocity. The airstream surface must be protected with a durable acrylic surface coating specifically formulated to:

1. Be no more corrosive than sterile cotton when tested in accordance with the test method for corrosiveness in ASTM C665.

2. Absorb no more than 3 percent by weight when tested in accordance with the test method for moisture vapor sorption in ASTM C1104.

3. Not support the growth of fungus or bacteria, when tested in accordance with the test method for fungi resistance in ASTM C1071, ASTM C1338, ASTM G21, and ASTM G22.

4. Show no signs of warpage, cracking, delaminating, flaming, smoking, glowing, or any other visibly negative changes when tested in accordance with the test method for temperature resistance in ASTM C411.

5. Have a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with the test method for surface burning in ASTM E 84.

6. Meet the sound absorption requirements when tested in accordance with the test method for sound absorption in ASTM C423.

7. Show no evidence of continued erosion, cracking, flaking, peeling, or delamination when tested in accordance with the test method for erosion resistance in UL181.

D. Type D4: Fire Rated Duct Insulation (High Temperature Flexible Blanket); see Section 15295.

E. Type D5: Outdoor Duct Insulation (Closed Cell Flexible Elastomeric Insulation); 1 inch thick material that has a service temperature range from –60 degrees F to 180 degrees F. This outdoor duct insulation meets ASTM C 177 or C 518 and shall have minimum 'k' value of 0.27 Btu-in. / hr-ft2- degrees F at minimum density measurement of 3 lb/cu ft. The insulation and outside surface must be protected with a white Thermo Plastic Rubber Membrane formulated to:

1. Be resistant to UV, and ozone, acid rain, and physical elements produced from outdoor weather per ASTM E 96 Procedure A.

2. Have aflame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with the test method for surface burning in ASTM E 84.

3. Show no evidence of continued erosion, delaminating, cracking, flaking, or peeling when tested in accordance with the test method for erosion resistance in UL181. Be resistant to mold growth resistance, ASTM G 21/C 1338 resistant to fungi, and resistant to bacteria growth per ASTM G 22.

F. Type D6: Ductliner (to be used in return air sound boots only), flexible glass fiber; ASTM C1071; Type II, 'k' value of 0.23 at 75 degrees F; 3.0 lb/cu ft minimum density; coating air side for maximum 4,000 feet per minute air velocity. The airstream surface must be protected with a durable polyacrylate copolymer emulsion specifically formulated to:

1. Not support the growth of fungus or bacteria, when tested in accordance with the test method for fungi resistance in ASTM D 5590 with "0" growth rating.

2. Act as a fungicidal protective coating: water based, VOC < 50 g/l. Fungicidal coating must be EPA registered for use in HVAC duct systems. Manufacturer: H.B. Fuller Construction Products Inc., Foster 40-20 (white) or 40-30 (black) Fungicidal Protective Coating or approved equal. Coatings may also be used to repair damage to duct liner insulation.

G. Type D7: Finish and install over entire areas of walls/doors/ceiling of air handling rooms/elevator equipment rooms 2" thick acoustical type fiberglass hullboard insulation 3# density, applied over Stick-Klips 12" on center. One side of insulation shall be glass fabric faced with perforated holes. Stick-Klips shall be applied to wall with Construction Adhesive. Acoustical material shall be applied over Stick-Klips with duct linear adhesive spotted between pins. Joints to be sealed with fiberglass lagging tape. Glass fabric to be perforated holes shall be side facing out. Manufacturer: Nautica IMO PFG Acoustic Board as manufactured by RB, LLC.

2.04 INSULATION ACCESSORIES

A. Adhesives: Waterproof vapor barrier type, meeting requirements of ASTM C916; Childers CP-82 or Foster 85-20/85-60.

B. Weather Barrier: Breather Mastic:, Childers CP-10/CP-11 or Foster 46-50 White..

C. Vapor Barrier Coating: Permeance - ASTM E 96, Procedure B, 0.08 perm or less at 45-mil dry film thickness, tested at 100F and 50%RH; Foster 30-65 or Childers CP-34

1. When higher humidity levels may be of concern, only specify the following fungus/mold resistant coating: Foster 30-80 AF (anti fungal). Coating must meet ASTM D 5590 with 0 growth rating**

D. Reinforcing Mesh: 10x10 or 9x8 glass mesh; Foster Mast a Fab or Childers #10

E. Jacket: Pre-sized glass cloth, minimum 7.8 oz/sq yd.

F. Type D4 Insulation Adhesive: See Section 15295.

G. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.

H. Joint Tape: Glass fiber cloth, open mesh.

I. Tie Wire and Wire Mesh: Annealed steel, 16 gage.

J. Stainless Steel Banding: 3/4-inch wide, minimum 22 gage, 304 stainless.

K. Armaflex 520, 520 BLV, or Foster 85-75 contact adhesive.

L. Armatuff 25 white seal seam tape.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify that ductwork has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

C. Maintain required ambient temperature during and after installation for a minimum period of 24 hours.

3.02 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Extend duct insulation without interruption through walls, floors, and similar penetrations, except where otherwise indicated.

D. Provide external insulation on all round ductwork connectors to ceiling diffusers and on top of diffusers as indicated in the Ductwork Insulation Application and Thickness Schedule and the Drawings. Secure insulation to the top of ceiling diffusers with UL181B-FX listed polypropylene duct tape Do not insulate top of ceiling diffuser if it is used in ceiling return air plenum or in an open space with no ceiling.

E. Flexible and Rigid fiberglass insulation (Types D1 and D2) application for exterior of duct:

1. Secure flexible insulation jacket joints with vapor barrier adhesive, tape. Tape shall be UL181B-FX listed polypropylene duct tape.

2. Install without sag on underside of ductwork. Use 4-inch wide strips of adhesive on 8-inch centers and mechanical fasteners where necessary to prevent sagging. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

3. Insulate standing seams and stiffeners that protrude through the insulation with 1-1/2 inch thick, unfaced, flexible blanket insulation. Cover with reinforcing mesh and coat with vapor barrier finish coating.

4. On circumferential joints, the 2-inch flange on the facing shall be secured with 9/16 inch outward clinch steel staples on 2-inch centers, and taped with minimum 3-inch wide strip of glass fabric and finish coating.

5. Vapor seal all seams, joints, pin penetrations and other breaks with vapor barrier coating reinforced with reinforcing mesh.

F. Duct Liner (Type D3 or D6) application for interior of return air sound boots:

1. Secure insulation with 100 percent coverage of duct liner adhesive, pins and clips not more than 18 inches on center.

2. Secure bottom of duct insulation using alternate single and double clips. The first pin will secure the insulation and the second clip will be used to secure the cladding. Isolate the exterior clip from the cladding by using two 1/8 inch closed cell neoprene (Armaflex) washers on either side of the cladding. Predrill holes in cladding and avoid contact with pin during installation.

3. For round duct, secure insulation with 100 percent coverage of duct liner adhesive. Secure cladding with 3/4 inch, 0.020 inch stainless steel bands on 12-inch centers.

4. For joints and overlaps, fold cladding to form a double thickness hem 2 inches minimum. Seal with a non-shrink, non-hardening sealing compound.

5. Type D6: Provide fungicidal coating in air handlers ten feet on either side, first ten feet downstream of cooling coils, ten feet downstream of mix boxes, in mechanical rooms or as otherwise specified in potentially high humidity areas in the duct system shall be coated with an fungicidal coating; EPA registered for use in HVAC duct systems at a coverage rate of 80 ft2/gallon.

G. Insulation (Type D4) application for exterior of fire rated ducts:

1. See Section 15295.

2. Penetrations: Where ducts penetrate fire rated walls, floors and roofs, the duct wrap shall be used in conjunction with a firestop system that is listed by a nationally recognized laboratory and rated for penetration of a rated wall or floor by the fire rated grease duct system used.

H. Insulation (Type D5) application for outdoor ducts:

1. Horizontal ductwork located outdoors shall be sloped at a minimum 2-degree angle to prevent the accumulation of water on top of the finished insulated duct. Support members that connect directly to the ductwork are to be insulated with this same material. Keep compression or sharp creases of outdoor insulation to a minimum by distributing the weight of the duct resting on horizontal duct support members.

2. Follow the insulation manufacturer's installation instructions and procedures to assure the ductwork is properly insulated and that the insulation will meet the manufacturer's warranty requirements.

I. All ductwork, accessories, and all plenums including metal and masonry construction, etc., shall be insulated as indicated on the Drawings, as specified herein and as required for a complete system. In each case, the insulation shall be equal to that specified and materials applied and finished as described in these Specifications.

J. Flexible ductwork connections to equipment shall not be insulated.

K. Where vapor barriers are required, the vapor barrier shall be on the outside. Extreme care shall be taken that the vapor barrier is unbroken. Joints, etc., shall all be sealed. Where insulation with a vapor barrier terminates, it shall be sealed off with the vapor barrier being continuous to the surface being insulated. Ends shall not be left raw.

L. Extreme care shall be taken in insulating high and medium pressure ductwork including all ductwork between the fan discharge and all mixing boxes to ensure the duct is not pierced with sheet metal screws or other fasteners. All high and medium pressure ducts in these Specifications are classified as high velocity ductwork.

M. Where canvas finish is specified use lagging adhesive/coating to prevent mildew in securing canvas. Do not use wheat paste.Use only anti fungal lagging adhesive that adheres to ASTM D 5590 with 0 growth rating. (Foster 30-36AF, Childers CP-137AF). In addition, cover all exterior canvas-covered insulation with a fire retardant weather barrier mastic.

N. All supply ductwork in the Project shall be insulated; all exhaust and fume hood exhaust ductwork shall not be insulated, unless used for energy recovery purposes or noted on drawings.

O. Flexible round ducts shall be factory insulated.

3.03 INSPECTION

A. Visually inspect the completed insulation installation per manufacturers recommended materials, procedures and repair or replace any improperly sealed joints.

B. Where there is evidence of vapor barrier failure or "wet" insulation after installation, the damaged insulation shall be removed, duct surface shall be cleaned and dried and new insulation shall be installed.

3.04 DUCTWORK INSULATION APPLICATION AND THICKNESS SCHEDULE

Ductwork System	Application	Insulation Type	Insulation Thickness

Ductwork System	Application	Insulation Type	Insulation Thickness
Supply Air	All	D1	2"
Mechanical Room Walls	All	D7	2”
Return Air	All	D1	2"
Exhaust / Outside Air	All	D1	2"
Supply Air Diffusers	Top of Diffuser	D1	2"
Return Air Sound Boots/Elbows	All	D3	1"

END OF SECTION

SECTION 15330 – WET PIPE SPRINKLER SYSTEM

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install pipe, fittings, valves, connections, hangers, supports, sleeves and appurtenances for new, rework and/or expansion of existing wet combination sprinkler and standpipe systems with supplementary items necessary for complete, code compliant and approved installation. These specifications are intended to provide complete, and in proper operation, all sprinkler system piping, equipment, heads, valves, controls, and accessories, all as specified herein or shown on the accompanying drawings, or reasonably implied in either. This portion of the building is already provided with complete coverage sprinkler system for the spaces designated on the drawings classification as required. New work shall consist of sprinkler head replacement and sprinkler head relocation. System shall be re-calculated if required by Fire Marshall. Verify all pertinent criteria (including survey of the existing sprinkler piping system) and shall be the responsibility of the Sprinkler Contractor. The systems shall conform to layout shown and meet all requirements of agencies listed under "REGULATIONS AND STANDARDS" below. Refer to plans and specifications for additional information.

B. Contractor shall include within his bid all materials and Work to provide a 100% sprinkler protection for all areas in new construction or for the entire smoke compartment affected by renovation work.

C. Size all branches and mains by hydraulic calculations. Contractor shall conduct a water flow test to obtain water supply information to determine actual available volume and pressures as a design basis for the system. Provide a 5 psi cushion for all hydraulic designs. This Contractor shall verify that the affected existing systems are configured and functioning properly according to NFPA 13. Hazard classifications for fire protection system design, installation and water supplies shall be in accordance with NFPA Standards. EXCEPTION: All pipe sizes and water flow demand for Light Hazard Occupancies shall be based upon Ordinary Hazard (Group 1) as the minimum system design. Sprinkler head locations and spacing for Light Hazard Occupancies shall be in accordance with NFPA 13 requirements.

D. Interface all new flow and valve supervisory switches with building fire and smoke alarm systems.

E. Provide temporary fire protection (Contractor's Means and Methods) during the construction phase of Project to conform with temporary life safety measures. Contractor to rotate heads in upright position once ceilings have been removed along with adding additional temporary smoke detectors as required. Contractor to inform and obtain approval from the Owner prior to any interruptions of existing fire protection, domestic water or fire alarm systems. Adhere to OLOL Medical Center Facilities Planned Utility Outages Policy for outage and shutdown requests.

F. The Louisiana State Fire Marshal's Office is the Local Authority Having Jurisdiction (AHJ) for fire protection system equipment, materials, installation and applicable code interpretations.

1.03 REFERENCE STANDARDS

A. is the intention of these specifications and the accompanying drawings, that all elements and features of the fire protection system shall be in accordance with the standards of the National Fire Association (NFPA), the Louisiana State Fire Marshal, all applicable building codes, Owner's Insurance Agency and Property Insurance Association of Louisiana whether so indicated or not. NFPA standards are on file in office of Architect and may be examined at the Contractor's request.

B. All material and construction shall conform to the requirements of all building, plumbing and sanitary codes and laws in force in the locality in which the work is to be done. All materials and construction shall also conform to the rules and regulations listed above under "Reference Standards".

1.04 QUALITY ASSURANCE

A. Standpipe and sprinkler system design, testing; cleaning, certification, materials, equipment and installation shall meet the requirements of standards set by the Louisiana State Fire Marshal's Office. Obtain and become familiar with requirements of Owner's insurance underwriter and incorporate all applicable provisions for compliance. Equipment and components shall bear FM label or UL marking. Provide manufacturer's name and pressure rating marked on valve body.

B. All hose threads, coupling types, etc., utilized in the fire protection systems shall conform to the standards and requirements of the City of Baton Rouge and Baton Rouge Fire Department.

C. Maintain at least one copy of all system related documents on Site.

D. Design sprinkler system under direct supervision of a R.M.E.'s (Responsible Managing Employee (R.M.E.), Certified Nicet Level IV) or a registered Louisiana Mechanical Engineer experienced in design of this Work and licensed in the State of Louisiana. All design submittal documents and Shop Drawings shall bear the R.M.E.'s signed and dated registrations number. The system shall be installed by a firm having minimum three years experience regularly engaged in the design and installation of automatic fire protection systems in accordance with requirements of the National Fire Protection Association and the State of Louisiana Fire Marshal's office. Evidence to support the above requirements shall be submitted with Shop Drawings. Working plans, material submittals and hydraulic calculations shall also be reviewed and stamped by a fire protection engineer licensed in the State of Louisiana. If working drawings, material submittals and hydraulic calculations meet all applicable, the fire protection engineer shall submit a letter of approval to the project engineer for final approval. NO WORK shall begin until the Louisiana State Fire Marshal's Office grant final approval. The Contractor is solely liable for any and all work performed or material purchases made prior to the Louisiana State Fire Marshal's Office final approval.

1.05 SUBMITTALS

A. General:

a. All new applications employing six (6) or more sprinklers and all rework applications employing twenty (20) or more sprinklers shall be submitted for approval as described herein. Product data shall be submitted for all size Projects as described herein.

B. Product Data:

a. Provide data on sprinkler heads, piping materials, joining methods, supports, valves, flow switches, tamper switches and all other components and accessories intended to be installed. Include manufacturers' catalog information, Code and Standards compliance, performance ratings, rough-in details, weights, finishes, support and connection requirements.

b. Submit one of each style of sprinkler head proposed.

C. Record Documents:

a. Submit preliminary layout showing head locations within coordinated ceiling grid and inspector's test station locations for review by Architect/Engineer.

b. Submit verification of Contractor's design and installation qualifications.

c. Provide full written description of manufacturer's warranty.

d. Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests. Refer to paragraph 3.04 B, within this specification section.

e. Shop Drawings:

1) Submit detailed and accurate Shop Drawings electronically of entire systems prior to fabrication. Indicate system controls, hydraulic reference points, detailed pipe layout, valves, hangers and supports, components and accessories.

2) Hydraulic calculations: Submit flow test results and comprehensive hydraulic data sheets complying with NFPA 13. Verification of the adequacy of water pressure and other pertinent water supply data shall be the responsibility of the design engineer.

3) Where expanding existing systems, the submitted design drawings shall show a sufficient amount of the existing system as required, the minimum shall show back to cross main or feed main to clearly identifying how the new work connects to the existing system.

f. Record Drawings and Closeout Documentation:

1) Provide three sets of record drawings (electronically and on hard copy) indicating actual installed locations, sizes and types of sprinkler heads, piping, valves, supports, equipment and all other system components. Identify all deviations from approved submittal drawings.

2) Provide three sets of final hydraulic calculations.

3) Submit certification letter by engineer of record stating that the fire protection systems design complies with Referenced Standards.

4) Submit verification of Contractor's design and installation qualifications.

5) Provide full written description of manufacturer's warranty.

6) Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests. Refer to paragraph 3.04 B, within this specification section.

7) Provide all written exception and authorizations for deviations from this specification.

D. Operation and Maintenance Data:

a. Include components of system, servicing requirements, inspection data, replacement part numbers, location and numbers of service depot. Provide a preventive maintenance schedule for all applicable equipment and systems.

1.06 DELIVERY, STORAGE AND HANDLING

A. All materials shall be new, undamaged, and free of rust. Protect installed piping, valves and associated materials during progression of the construction period to avoid clogging with dirt, and debris and to prevent damage, rust, etc.

B. Accept valves on-site in shipping containers and maintain in place until installation. Provide temporary protective coating and end plugs on valves not packaged within containers. Maintain in place until installation.

C. Protect all materials that are to be installed within this Project from exposure to rain, freezing temperatures and direct sunlight. EXCEPTION: Materials manufactured for exterior locations.

1.07 EXTRA MATERIALS

A. The Contractor shall provide supply of spare heads of each type installed under the Contract in quantities as required by National Fire Protection Association Standard No. 13. The heads shall be packed in a suitable wall mounted sprinkler cabinet and shall be representative of and in proportion to, the number of each type and temperature rating installed. In addition to the spare heads, the Contractor shall provide not less than three special sprinkler head wrenches for each type of head. The cabinet shall be permanently affixed to a wall near the fire pump controller.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. All piping, materials and equipment used in the installation of sprinkler and standpipe systems shall be new and listed as approved by the Underwriters' Laboratories, Inc., List of Inspected Fire Protection Equipment and Materials and the Factory Mutual Testing Laboratories List of Approved Equipment, Fire Protection Devices and Devices Involving Fire Hazard and shall be the latest design of the manufacturer.

C. Pressure ratings of pipe, fittings, valves, gauges and all other water carrying appurtenances shall be suitable for the designed system pressures in which they are installed.

D. The installing Contractor shall identify piping, fire department connections, valves and hydraulic design information in accordance with applicable NFPA Standards.

2.02 MANUFACTURER

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Sprinkler Heads: Reliable, Grinnell, Viking, Flexhead.

D. Flow Switches: Notifier, Potter-Roemer, System Sensor.

E. Tamper Switches: Notifier, Potter-Roemer, System Sensor.

F. Gate Valves: Mueller, Nibco, Stockham, Kennedy.

G. Butterfly Valves: Milwaukee, Nibco, Grinnell, Victaulic, Kennedy.

H. Ball Valves: Milwaukee, Nibco, Stockham, Victaulic.

I. Check Valves: Mueller, Nibco, Stockham, Grinnell, Victaulic.

J. Grooved Fittings and Couplings: Grinnell, Anvil, Victaulic.

K. Hose Valves: Elkhart, Larsen, Potter-Roemer.

L. Fire Department Connections: Elkhart, Larsen, Potter-Roemer.

M. Electric or Water Motor Alarm Bells: Potter-Roemer, Reliable, Victaulic, Grinnell, and Viking.

N. In-Building Water Supply Riser: Ames.

2.03 SPRINKLER HEADS

A. Unless otherwise specified or indicated on the drawings, sprinkler heads shall be regular automatic closed type spray heads with temperature ratings as required by National Fire Protection Association Standard No. 13.

a. Heads within smoke compartments containing sleeping rooms shall be quick-response type.

b. The installing contractor is to verify the existing type of sprinkler head installed in area of renovation projects to ensure the response type is the same. Standard response and quick heads are not to be mixed in a project.

c.

d. All Sprinkler heads installed under finished ceilings (unless noted here-in-after) shall be fully-recessed type with cover plate with white finish. Those sprinkler heads to be located in metal panels to be factory painted to match color of metal panel.

e. Sprinkler heads for sidewall applications, provide sidewall type with chrome plated finish and escutcheons.

f. Unfinished Areas without Ceilings: Provide bronze upright. Protect sprinkler heads against mechanical injury with standard guards where required.

g. Cold Rooms (≤ 42°F.) and Areas below Heated Ceiling/Soffit Spaces Susceptible to Freezing: Provide dry pendant type with chrome finish and two-piece escutcheon. (Areas include but not limited to; walk-in freezers, exterior overhangs, canopies…).

h. Elevator Equipment Rooms: Provide 212°F intermediate temperature classified heads.

i. Sprinkler heads in all laboratory areas and patient rooms shall be quick response type.

j. Sprinkler heads shall be rated at 165, 212, and/or 286 degrees Fahrenheit as required to suit the hazard protected. Connections shall be ½ or ¾ inch, male threads, ANSI B2.1, with ½ and/or 17/32 inch orifice. Sprinkler heads shall be tested and listed by UL and FM. Sprinklers shall be the product of the manufacturer represented by the successful sprinkler Contractor.

2.04 PIPING MATERIALS

A. Qualifications of manufacturers: 2-1/2" and larger pipe & fittings, imported pipe is acceptable, Chinese & Taiwanese pipe and fittings are not acceptable. All 2" pipe and fittings (T&C) and smaller to be domestic, no exception product of the United States of America, manufacturers to be Wheatland Tube and Textube. All copper piping to be a product of the United States of America. Manufacturer's of copper pipe to be Cerro, Reading, and Mueller. Contractor to provide submittals of pipe as noted within this specification.

B. Underground piping: Piping: Ductile-iron Pipe (DIP) or Cast-iron Pipe (CIP), AWWA C 106, with fittings complying with AWWA C 110 and rubber gaskets complying with AWWA C111 or polyvinulchoride (PVC) C-900 for fire service, 175 psi, UL listed.

C. Buried Water Service Entrance Piping

a. Pipe - Cement mortar lined ductile iron

b. Fittings – Cement mortar lined ductile iron using mechanical joints

c. Optionally, where building structural components permit, water service entrance may be composed of a single extended 90 degree fitting of fabricated 304 stainless steel tubing, maximum Working pressure of 175 psi with grooved-end connection on the outlet (building) side and a cast iron pipe size coupler on the underground (inlet) side.

d. All pipe and fittings shall be encased with polyethylene film having a minimum thickness of 8 mils.

D. Unburied Piping Wet Piping and Fittings

a. All pipe and fittings shall be provided with Microbiological Inhibiting Coating (MIC).

b. Piping 2-1/2" and smaller: Welded and seamless carbon steel pipe, Schedule 40, ASTM A 53, fittings shall be threaded black cast iron 1125 psi, ANSI B16.4; joints shall be threaded. However; provide 300 psi fittings were indicated in 2.04 "DESIGN PRESSURE RATINGS". Also, provide 300 psi fittings for sprinkler piping in any area having high pressure sprinkler systems.

c. Piping 2-1/2" and larger: Welded and seamless carbon steel pipe, Schedule 40, ASTM A 53; fittings shall be grooved type malleable iron, 500 psi rating, ASTM A 47, listed by UL and FM; joints shall be rolled grooved type.

d. Interior pipe not subject to freezing shall be Schedule 40 (minimum thickness) black steel.

e. Exterior pipe including pipe installed within parking garages shall be Schedule 40 (minimum thickness) galvanized steel.

f. Interior pipe subject to freezing shall be Schedule 40 (minimum thickness) galvanized steel

g. Flexible sprinkler piping and fittings are not acceptable.

2. Dry Type Sprinkler Piping

a. Piping 2" and smaller – Welded and seamless hot0dipped galvanized carbon steel pipe, Schedule 40, ASTM A 53, fittings shall be threaded galvanized malleable iron, 300 psi, ANSI B16.3; joints shall be threaded.

b. Piping 2-1/2" and larger: Welded and seamless hot dipped galvanized carbon steel pipe, Schedule 40, ASTM A 53; fittings shall be grooved type hot dipped galvanized iron 500 psi rating, ASTM A 47, listed by UL and FM; joints shall be cut grooved type.

2.05 VALVES

A. Similar types of valves shall be the product of one manufacturer; i.e., all butterfly valves shall be of the same manufacture, all ball valves shall be of the same manufacture, etc.

B. All valves used to control the flow of water to and within standpipe and sprinkler systems shall be listed indicating type complete with electric supervisory switches. Coordinate wiring with the electrical Contractor.

C. Hose valves shall have bronze finish; 2-1/2" hose thread connections with cast brass pin lug cap and chain.

D. All 1-1/2" hose valves shall be provided with adjustable regulators where required to limit static and residual pressures to 100 psi. All 2-1/2" hose valves shall be provided with adjustable regulators where required to limit static and residual pressures to 175 psi. 2-1/2" hose valves shall be initially set for an outlet pressure of between 125 to 150 psi where allowed by system design.

E. Drain Valve:

   a. Bronze compression stop with hose thread nipple and cap.

   b. Brass ball valve with cap and chain, hose thread.

F. Gate Valve:

   a. Up to and including 2 Inches : Bronze body, bronze trim, rising stem, handwheel, inside screw, single wedge or disc, threaded ends.

   b. Over 2 Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, single wedge, flanged ends.

G. Globe or Angle Valves:

   a. Up to 2 Inches: Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable composition disc, screwed ends, with backseating capacity, repackable under pressure.

   b. Over 2 Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

H. Ball Valves:

   a. Up to and including 2 Inches: Bronze or Stainless steel one piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle, and balancing stops, threaded ends.

   b. Over 2 Inches: Cast steel body,chrome plated steel ball, teflon seat and stuffing box seals, lever handle, or gear drive handwheel for sizes 10 inches and over, flanged.

I. Butterfly Valves:

a. Bronze body, stainless steel disc, resilient replaceable seat, threaded ends, extended neck, handwheel and gear drive and integral indicating device ,and built-in tamper proof switch.

b. Cast or ductile iron body, chrome plated ductile iron disc, resilient replaceable EPDM seat, wafer or lug ends, extended neck, handwheel and gear drive and integral indicating device, and built-in tamper proof switch.

J. Check Valves:

a. Up to and including 2 Inches: Bronze swing disc, screwed ends

b. Over 2 Inches: Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends

c. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer or flanged ends

2.06 PRESSURE REDUCING VALVES (SPRINKLER SYSTEM)

A. Valve(s) shall be in line type, rising stem, cast brass body with female NPT inlet x female outlet. Provide supervisory switch bracket and open-closed visual indicator. Valve shall reduce inlet pressure from 400 psi to desired outlet pressure. Valve pressure setting shall be tamper proof.

PART 3 - EXECUTION

3.01 DESIGN

A. The sprinkler systems shall be designed as required for occupancies specified by experienced personnel have competency in the execution of such work. Sprinkler system design shall be performed only by engineers licensed by the State of Louisiana. Provide the following:

1. Wet pipe systems for all areas:

a. New construction, contractor to provide wet pipe sprinkler system, light hazard, (0.10 gpm/sq/ ft/ over the most remote 1500 sq. ft.), except kitchen, storage room(s), mechanical rooms, breakrooms, and janitors closets which shall be ordinary hazard, group 2 (0.15 gpm/sq/ ft/ over the most remote 1500 sq. ft.). Contractor to design system with a mandatory 5 pound cushion

B. It shall be the sprinkler contractor's responsibility to include in his bid to survey the existing sprinkler systems serving the existing areas of the Children's Hospital Medical Center to provide all required drawings and layouts needed to provide the required hydraulic calculations needed for approval by the Louisiana State Fire Marshal's Office for the new addition and all other renovated areas. Any and all costs associated with these surveys shall be included in the sprinkler contractor's bid.

C. Contractor to provide additional sprinkler heads under any obstructions, overhangs, ductwork, equipment, etc. 4'0" and wider. Contractor to provide sprinkler heads in all exterior overhangs required to protect window walls, above and below

D. Contractor to provide any and all sprinkler heads for water curtains required at all rated walls containing glass to maintain designated rating.

E. Sprinkler contractor shall co-ordinate routing of piping with mechanical and electrical. Contractor can assume that there will be conflicts and shall include in his bid for these possibilities. No additional compensation will be allowed regarding this matter.

F. The design shall comply with NFPA 13 (latest editions), codes, standards, and recommended practices. No extra charges will be approved for changes to drawings, piping, etc. required to conform to NFPA 13 to be used.

3.02 INSTALLATION

A. All installation shall be in accordance with manufacturer's published recommendations.

B. Install all materials and products in accordance with manufacturer's published recommendations. Use tools manufactured for the installation of the specific material or product.

C. Sprinkler heads shall be located in a symmetrical pattern related to ceiling features such as grid, beams, light fixtures, diffusers, etc. and where applicable, heads shall be located symmetrically with the ceiling grid, centered in two directions (center of tile). Locate heads to provide code required distances away from lights, exit signs, etc., and all other items that could interfere or effect sprinkler discharge. Provide additional heads which may be required for coordinated ceiling pattern, without additional cost, even though number of heads may exceed code minimum requirements.

D. Apply temporary protective covers during construction to ensure that sprinkler heads and escutcheons do not receive field paint.

E. Install fire sprinkler head cages/guards to sprinkler heads to protect heads susceptible to mechanical injury and to reduce the possible of accidental discharge (i.e. mechanical rooms, elevator shafts/pits, etc.).

F. Inspector's test valves shall be installed for each sprinkler control valve assembly equipped with a flow switch and piped to a stairwell drain test riser within the building. When used in combination with the drain and test riser requirements for testing standpipes equipped with pressure-regulating hose valves, the drain test riser size shall be a minimum size of 3 in. A 2-½" female test connection with cap shall be provided on each floor of the 3" test riser with using pressure reducing hose valves. Each drain test riser discharge shall be piped to the exterior of the building. The exterior discharge point shall not discharge on a sidewalk, driveway or any other area that could result in staining, water accumulation or soil erosion. When exterior piping is not feasible, the drain test riser shall be piped to a suitable drain having sufficient capacity to accept full flow of pressure-regulating hose valves.

G. Provide hangers for horizontal piping at intervals not exceeding twelve feet for pipe sizes 1-1/4" and smaller or fifteen feet for pipe sizes 1-1/2" and larger, and as recommended within NFPA 13.

H. Route piping in orderly manner, plumb and parallel to building structure and concealed above ceilings where possible. Locate concealed valves, switches and alarm connections in accessible location, and coordinate size and location of access panels/doors with General Contractor.

I. Install piping to conserve building space and not interfere with use of space and other work. Coordinate with other trades to avoid conflicts and provide all required offsets, piping, auxiliary drains, etc. to properly install system.

J. Group piping whenever practical at common elevations.

K. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.

L. Flange and coupling bolts shall be torque in sequence per manufacturer specifications.

M. Pipe joints, clamps, groove couplings, flanges, unions, etc., shall not directly contact or be encased in concrete, or be located within wall, floor or roof penetrations.

N. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

O. Prepare pipe, fittings, supports and accessories for finish painting where required.

P. Do not penetrate building structural members unless indicated otherwise on Contract Drawings or approved by Structural Engineer..

Q. Each pipe projecting through roof shall be installed in accordance with Contract Specifications and Drawings. Penetrations shall be sealed air and water tight. Refer to details on Contract Drawings and coordinate with General Contractor for flashing requirements.

R. Penetrations through fire rated walls, floors and partitions shall be sealed to provide a U.L. rating equal to or greater than the wall, floor or partition.

S. Seal all penetrations through exterior building walls and grade beams air and watertight.

T. Install valves with stems upright, not inverted. All valves shall be located such that the removal of their bonnets is possible. Valves placed in horizontal lines shall be installed with their valve stems inclined at an angle of a minimum of 30 degrees above the horizontal position. Valves shall be installed as nearly as possible to the locations indicated in the Construction Drawings. Any change in valve location must be so indicated on the Record Drawings. Remove protective coatings after installation.

U. Provide drain valves at main shutoff valves, low points of piping and apparatus.

V. All shutoff and test valves shall be located on the floor they serve, unless specific written authorization is received from LSU Medical Center.

W. Locate and secure hose cabinets plumb and level. Locate angle valve in cabinet at 60 inches above floor.

X. Underground fire protection system piping shall be installed in accordance with the requirements of NFPA 24, Private Fire Service Mains and Their Appurtenances. Provide concrete thrust blocking at each change of direction of the piping and at all tees, plugs, and caps in accordance with NFPA 24. Where thrust blocking is impractical, fittings with a mechanical joint retainer gland, approved for the piping material utilized, may be used in lieu of thrust blocking.

Y. All piping shall be clean when it is installed. Before installation it shall be checked, upended, swabbed, if necessary and all rust or dirt from storage or lying on the ground shall be removed. Flush entire system of foreign matter.

Z. Heat generated by welding or soldering procedures shall not be transmitted to valves, groove couplings, or any other components installed within the piping system that may be damaged due to high temperatures. Contractor shall take all precautions necessary and allow heated piping to cool to ambient temperature before attachment.

AA. All screw joints shall be made with taper threads properly cut. Joints shall be made tight with Teflon tape or non-toxic joint compound applied to the pipe threads only and not to fittings. When threads are cut on pipes, the ends shall be carefully reamed to remove any burrs. Before installing pipe that has been cut and threaded, the lengths of pipe shall be upended and hammered to remove all shavings and foreign material.

BB. Sprinkler contractor to provide all drain lines required by NFPA 14 and 13 and route to exterior wall, extend out turn down with elbow. All exterior drain lines to be galvanized. If exterior wall not available, sprinkler contractor to co-ordinate with plumbing contractor to provide drain of sufficient size to handle draining of system as required by NFPA 13 and 14.

CC. Sprinkler heads location indicated on plans is to be used as a guide only, exact location and numbered to be based and determined by design of sprinkler system, any additional heads required shall be installed as part of the contract with no additional compensation.

DD. Co-ordinate all sprinkler alarm/supervisory tie-in connection points with fire alarm contractor.

3.03 WELDED PIPING

A. Welding of pipe/fittings in normally occupied buildings is prohibited. Offsite welding is acceptable. Should welding be required in a normally occupied building for connecting to an existing welded system, obtain written approval from User Agency/Owner and comply with NFPA 51 B.

B. All welding materials, procedures, qualifications and records shall comply with applicable NFPA requirements.

3.04 SYSTEM TESTING AND FLUSHING

A. Testing, cleaning, flushing and inspection shall be done in accordance with NFPA requirements.

B. The installing Contractor shall complete and sign the appropriate Contractor's Material and Test Certificates included within NFPA 13 and 14.

3.05 ZONING

A. All flow switches and tamper switches shall relay their activation to each annunciator panel and the main fire alarm panel.

B. Sprinkler system zoning shall coincide with building smoke compartmentalization unless noted otherwise on Contract Drawings. As a minimum, each floor level shall be a separate zone.

3.06 TRAINING

A. Contractor shall provide for the service of a competent, trained and experienced agent to instruct and acquaint the Owner with the proper functioning, operation and maintenance of the fire protection systems and all installed components.

3.07 WARRANTY

A. The complete system shall be warranted in writing against defects in materials or Workmanship under normal use and service for a period of one year after date of Substantial Completion.

3.08 ELECTRICAL WORK

A. Fire protection equipment, control and alarm panels shall be supplied from an emergency power source, if available.

B. Control or signaling wiring shall not be installed in raceways with power unless specifically indicated on the drawings. Wiring and raceways for line voltage interlocking shall be work of this Section. Voltage shall be 115 volts, 1-phase, 60 hertz. Provide transformer where required. Control and signaling wiring and raceways between equipment specified under this Section shall be work of this Section. Signaling wiring and raceways associated with work of this Section and not specified as work of DIVISION 16 - ELECTRICAL shall be work of this Section.

C. A source of power may be indicated under DIVISION 16 - ELECTRICAL, for activating control devices where power for controls does not originate at the control transformer furnished with the started or control panel. Work of this Section shall include wiring required for controls from this source. If additional 120 volt power is required it shall be obtained from spare breakers at a location approved by the Architect. The cost of installation of raceways, wiring, etc. shall be included as work of this Division. The Contractor shall review electrical drawings prior to bidding.

END OF SECTION

SECTION 15400 – PLUMBING PIPING

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Provide materials and installation for complete first class plumbing systems, within and to five feet beyond building perimeter unless noted otherwise on Contract Drawings; Sanitary Waste and Vent Piping, Storm Drain Piping, Domestic Water Piping, Domestic Water Valves, Testing and other normal parts that make the systems operable, code compliant and acceptable to the authorities having jurisdiction.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. 2015 Edition of the International Plumbing Code.

2. ANSI/NSF Standard 61 - Drinking Water System Components - Health Effects.

1.04 QUALITY ASSURANCE

A. Manufacturer’s name and pressure rating shall be permanently marked on valve body.

B. The Contractor shall notify the manufacturer's representative prior to installing any copper press fittings. The Contractor shall obtain the representative’s guidance in any unfamiliar installation procedures. The manufacturer's representative of copper press fittings shall conduct periodic inspections of the installation and shall report in writing to the Contractor and Owner of any observed deviations from manufacturer’s recommended installation practices.

C. Manufacturer Qualifications: Company shall have minimum three years documented experience specializing in manufacturing the products specified in this section.

D. Installer Qualifications:

1. Company shall have minimum three years documented experience specializing in performing the work of this section.

2. Installation of plumbing systems shall be performed by individuals licensed by the Louisiana State Board of Plumbing Examiners as a Journeyman or Master Plumber. Installation may be performed by Apprentice Plumbers provided they are registered with the Louisiana State Board of Plumbing examiners and under direct supervision of a licensed plumber. All installation shall be supervised by a licensed Master Plumber.

3. All installers of copper press fittings shall be trained by the fitting manufacturer's appointed representative. Written notification of training shall be submitted to Owner prior to any installation.

1.05 SUBMITTALS

A. Product Data:

1. Code and Standards compliance, manufacturer's data for pipe, fittings, valves and all other products included within this specification section.

2. Grooved joint valves, couplings and fittings shall be specifically identified with the applicable style or series designation.

3. Manufacturer’s installation instructions.

B. Record Documents:

1. Record actual locations of valves, etc. and prepare valve charts.

2. Test reports and inspection certification for all systems listed herein.

3. Provide a certificate of completion detailing the domestic water system chlorination procedure and all laboratory test results.

4. Submit proposed location of access panels which vary from quantities or locations indicated on Contract Drawings.

5. Provide full written description of manufacturer’s warranty.

C. Operation and Maintenance Data:

1. Include components of system, servicing requirements, Record Drawings, inspection data, installation instructions, exploded assembly views, replacement part numbers and availability, location and contact numbers of service depot.

1.06 DELIVERY, STORAGE AND HANDLING

A. All materials shall be new, undamaged, and free of rust.

B. Accept valves on Site in shipping containers and maintain in place until installation.

C. Provide temporary protective coating and end plugs on valves not packaged within containers. Maintain in place until installation.

D. Provide temporary end caps and closures on pipe and fittings. Maintain in place until installation.

E. Protect installed piping, valves and associated materials during progression of the construction period to avoid clogging with dirt, and debris and to prevent damage, rust, etc. Remove dirt and debris and repair materials as work progresses and isolate parts of completed system from uncompleted parts.

F. Protect all materials that are to be installed within this project from exposure to rain, freezing temperatures and direct sunlight. EXCEPTION: Materials manufactured for exterior locations.

1.07 EXTRA MATERIALS

A. Provide the Owner with one differential pressure meter kit for use with domestic hot water return circuit balancing valves installed within this project. Kit shall include meter, hoses, connection accessories, circular slide rule, carrying case and valve manufacturer's curve charts.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Provide materials as specified herein and indicated on Contract Drawings. All materials and work shall meet or exceed all applicable Federal and State requirements and conform to adopted codes and ordinances of authorities having jurisdiction.

C. Pressure ratings of pipe, fittings, couplings, valves, and all other appurtenances shall be suitable for the anticipated system pressures in which they are installed.

D. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

E. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

F. The owner & lab service equipment shall be furnished and set in place under another section of these specifications and/or by separate contract. Plumbing Contractor shall provide necessary rough-in required for this equipment and shall completely connect all plumbing services for this equipment, providing cut-off valves and union for all plumbing supply service to each piece of equipment. It is the obligation of the plumbing contractor to obtain correct roughing-in dimensions and drawings for this equipment as well as the equipment furnished under this contract.

2.02 SANITARY WASTE AND VENT PIPING AND STORM DRAINAGE PIPING BELOW GRADE

A. PVC Pipe: Solid Wall Schedule 40 ASTM D 2665 (cellular "Foam Core" NOT allowed) with PVC fittings and joints ASTM D 2665 shall be solvent welded, for: All roof drainage piping, & sanitary sewer and vent piping located underground under building slab.

B. All potable water pipes, pipe related products, and materials that join or seal pipes conform to ANSI/NSF 61.

C. All solvent cements and primers used to join and seal PVC materials shall comply with the requirements of ANSI/NSF 14.

D. Apply primer to the pipe and freely in the socket keeping surface wet and applicator wet and in motion 5 to 15 seconds. Avoid puddling in the socket. Apply primer a second time to the fitting socket.

E. For checking penetration, scratch or scrape a few thousandths of the primed surfaces away. Repeated applications to either or both surfaces may be necessary. Weather conditions affect priming action. In cold weather more time is required for proper penetration.

F. Apply a full even layer of cement on the pipe O.D. for a distance slightly greater than the depth of the socket of the fitting. Coat the fitting socket with a medium layer, avoiding puddling. On belled end pipe, do not coat beyond the socket depth or allow cement to run beyond the bell. Put a second full even layer of cement on the pipe O.D. Cement layers must be without void and sufficient to fill any gap in the joints.

G. Immediately upon finishing cement application and before it starts to set, insert the pipe to the full socket depth while rotating the pipe or fitting a 1/4 turn to insure complete and even distribution of the cement. Hold joint together for a minimum of 10 to 15 seconds to make sure that pipe does not move or back out of the socket.

H. Immediately, after joining and before joint is set, gently place it back onto a level surface, wipe off all excess cement from the circumferences of the pipe and fitting.

I. When the atmospheric temperature is above 90 F to avoid excessive evaporation of the solvent from the cement just prior to joining use one or a combination of the following:

1. Shade or shelter the joint surfaces from direct exposure to the sun's rays for at least one hour prior to joining and during the joining process.

2. Make cement joints during early morning hours.

3. Apply cement quickly. On 6" and larger pipe, it is recommended that two men apply cement to pipe surface while the third applies it to the fitting socket.

4. Join pipe to fittings as quickly as possible after applying cement.

J. For pipe sized 6" and larger, a joining crew consisting of two men is required and the following additional steps necessary:

a. Rotation of the pipe in the fitting may be omitted.

b. Hold joint together for 1 to 3 minutes depending on pipe size.

c. As an aid for joining in these larger sizes, it is recommended that a come-along or pipe joining tool be used.

2.03 SANITARY WASTE AND VENT AND STORM DRAINAGE PIPING ABOVE GRADE:

A. Sanitary sewer waste, vent and storm drainage piping shall be service weight cast iron soil pipe and fittings with hubless connections using clamp type gasketed mechanical fasteners above ground and hub and spigot DWV pipe and fittings with neoprene compression gasket joints for all buried pipe. Cast iron soil pipe, fittings and hub gaskets shall be manufactured by Tyler Pipe or Charlotte Pipe and Foundry. All cast iron pipe and fittings shall be of the same manufacturer.

B. Unburied primary storm drainage and sanitary waste and vent piping for sizes 4” and smaller may be seamless copper DWV tube with wrought copper or wrought copper alloy solder joint drainage pattern DWV fittings.

C. Indirect waste piping sizes 1-1/4” through 2” serving fixtures and equipment shall be seamless copper DWV tube with wrought copper or wrought copper alloy solder joint drainage pattern DWV fittings.

D. Indirect waste piping sizes 1” and smaller serving equipment shall be type "L" hard drawn copper pipe and wrought copper or cast copper alloy solder joint fittings using lead-free solder and non-corrosive flux. Elbows shall be long radius type. Tee fittings shall be combination wye with 45 degree elbow.

E. Cast iron soil pipe compression gaskets shall be monolithically molded from an elastomer meeting ASTM C 564 and shall be of same manufacturer as pipe and fittings.

F. Clamps for joining hubless cast iron pipe and fittings sizes 1-1/2” through 15” shall meet the performance criteria of FM 1680, have type 304 stainless steel jacket, ASTM C 564 neoprene gasket and type 305 stainless steel band screws designed to be installed with a pre-set torque wrench. Couplings shall be manufactured by Clamp-All, Inc. HI-TORQ 125 or Husky, Inc., Orangeshield HD 4000.

G. Hubless piping systems shall not be used in a directly buried, underground application. EXCEPTION: No-hub type fittings with clamp type coupling joints may be used below ground for pipe sizes up to 10" at connections to existing cast iron sewers provided couplings are cast iron with stainless steel bolts as manufactured by MG Piping Products.

H. Solder for copper piping shall be lead-free Tin/Copper/Silver/Nickle(optional) solder conforming to ASTM B32, Wolverine Silvabrite 100 Lead-Free Solder or Harris Nick Lead-Free Solder. Use water soluble flux recommended by solder manufacturer and conforming to ASTM B813 and NSF 61, Wolverine Silvabrite 100 Water Soluable Flux or Bridgit Water Soluble Paste Flux.

I. Lubricant for drainage cleanout plugs shall be Loctite Marine Grade Anti-Seize or approved equal by Bostik Chemical Group, or Dow Corning Corporation.

J. Double sanitary tee fittings shall be not be used as a drainage fitting.

K. Provide IAPMO figure one, IAPMO figure five or double wye and eighth bend fittings on vertical lines serving back-to-back fixture drains.

L. Double wye and eighth bend fittings shall not be installed in horizontal drain lines.

M. All P-traps for floor drains, floor sinks and hub drains shall be deep-seal type.

N. Provide threaded brass or copper adapters to connect fixture supply stops and waste to service piping within walls. Galvanized nipples shall not be acceptable. Provide DWV copper trap adapters to connect lavatory, sink and drinking fountain trap outlets to sanitary system.

2.04 DOMESTIC WATER PIPING (INCLUDING COLD, HOT & SOFTENED WATER)

A. All materials within domestic water distribution systems that may come in contact with the potable water delivered shall comply with ANSI/NSF Standard 61.

B. All brass and bronze piping materials within domestic water distribution systems that may come in contact with the potable water delivered shall have no more than 15% zinc content.

C. NO grooved fittings or piping allowed for domestic water piping.

D. All unburied piping shall be type "K" hard drawn copper pipe and wrought copper or cast copper alloy solder joint fittings using lead-free solder and non-corrosive flux. Piping sizes 2-1/2" and larger may be type "L" hard drawn copper and wrought copper.

1. Flaring of tube and fitting ends to IPS dimensions is not allowed.

2. Provide a phenolic flange washer with flange adapter when the mating flange face is not a smooth, hard surface. Refer to manufacturer's installation instructions for additional details.

E. Unburied piping sizes ½" through 4" installed within occupied buildings for modifying existing systems may utilize copper press fittings when the following conditions are met:

1. Written approval of the Owner's Property Manager shall be obtained prior to bidding.

2. Fittings shall be installed in portions of systems having an operating pressure that will not exceed 200 p.s.i.g.

3. Fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22.

4. O-rings for copper press fittings shall be EPDM. Copper press fittings shall be rated at 200 psi working pressure and 250 degree working temperature.

5. All copper press fittings, couplings and specialties shall be manufactured by Viega.

6. Installation tools shall be as recommended by the fittings manufacturer.

F. Solder for copper piping shall be lead-free Tin/Copper/Silver/Nickle(optional) solder conforming to ASTM B32, Wolverine Silvabrite 100 Lead-Free Solder or Harris Nick Lead-Free Solder. Use water soluble flux recommended by solder manufacturer and conforming to ASTM B813 and NSF 61, Wolverine Silvabrite 100 Water Soluable Flux or Bridgit Water Soluble Paste Flux.

G. Dielectric waterway fittings shall have zinc electroplated steel pipe body with high temperature stabilized polyolefin polymer liner; manufactured by Victaulic, Style 47 or PPP, Inc. Series 19000, or Owner approved equal by Anvil.

H. Dielectric unions shall be rated at 250 psi, ground-joint type with inert, non-corrosive thermoplastic sleeve. End connection materials shall be compatible with respective piping materials; manufactured by EPCO Sales, Inc or Watts. Provide models to suit applicable transitions.

I. Dielectric flanges shall be rated at 175 psi, have nylon bolt isolators and dielectric gasket. Materials shall be compatible with respective piping materials; manufactured by EPCO Sales, Inc or Watts. Provide models to suit applicable transitions.

2.05 DOMESTIC WATER VALVES: (INCLUDING COLD AND HOT WATER)

A. All materials within domestic water distribution systems that may come in contact with the potable water delivered shall comply with ANSI/NSF Standard 61.

B. All brass and bronze valve materials within domestic water distribution systems that may come in contact with the potable water delivered shall have no more than 15% zinc content.

C. Similar types of valves shall be the product of one manufacturer; i.e., all butterfly valves shall be of the same manufacturer, all ball valves shall be of the same manufacturer, etc.

D. Line Shut-Off Valves up to and including 2” shall be two-piece bronze body of ASTM B584 Alloy 844, ASTM B61, or ASTM B62, full port ball type rated at 600 WOG with threaded connections, blow-out proof stem, plastic coated lockable lever handle, Teflon packing, 316 stainless steel ball and stem. Acceptable valves are NIBCO Model T-585-70-66-LL, or approved equivalent model by Crane, Milwaukee or Apollo.

E. Line Shut-Off Valves 2-1/2” and larger where system operating pressure will not exceed 160 p.s.i.g. shall be 200 WOG threaded lug type ductile iron body butterfly valve with extended neck, lockable lever handle, 416 stainless steel stem, aluminum bronze disc, EPDM liner and seal, suitable for bi-directional flow and dead end service with downstream flange removed. Acceptable valves are NIBCO Model LD-2000, or approved equivalent model by Keystone, Jamesbury, Milwaukee, Crane or Apollo.

F. Line Shut-Off Valves 2-1/2” and larger installed within systems having design operating pressures between 160 and 250 p.s.i.g. shall be threaded lug type ductile iron body butterfly valve with extended neck, lockable lever handle, 316 stainless steel stem and disc, EPDM liner and seal, suitable for bi-directional flow and dead end service with downstream flange removed. Acceptable valves are NIBCO Model LD-3022, or approved equivalent model by Keystone, Jamesbury, Dezurik, Milwaukee, Crane or Apollo.

G. Provide stem extensions of a non-thermal conducting material for valves in insulated lines to allow unobstructed operation.

H. Provide memory stops on all ball valves installed in domestic hot water return lines. Memory stops shall be adjustable after pipe insulation is applied.

I. Provide line shut-off valves that have the same inside diameter of the upstream pipe in which they are installed.

J. Swing Check Valves, 2" and smaller - “Y” or “T” pattern bronze, Class 150, with threaded connections and screw-in cap. Manufactured by NIBCO Model T-433-Y or approved equivalent model by Milwaukee or Crane.

K. Spring Loaded Check Valves, 2" and smaller - Silent closing, bronze, Class 125, with threaded connections, Buna disc, bronze or stainless steel spring. Manufactured by NIBCO Model T-480 or approved equivalent model by Milwaukee or Crane.

L. Swing Check Valves, 2-1/2" and larger - 200 pound CWP, Iron body, with bronze or stainless steel trim. Manufactured by NIBCO Model F-918-B or approved equivalent model by Milwaukee or Crane.

M. Swing Check Valves, 2-1/2" and larger - 285 pound CWP, Iron body, with stainless steel trim. Manufactured by NIBCO Model F-938-33 or approved equivalent model by Milwaukee or Crane.

N. Spring Loaded Check Valves, 2-1/2" and larger - 200 pound CWP, Iron body, with bronze or stainless steel trim. Manufactured by NIBCO Model F-910 or approved equivalent model by Milwaukee or Crane.

O. Spring Loaded Check Valves, 2-1/2" and larger - 400 pound CWP, Iron body, with bronze or stainless steel trim. Manufactured by NIBCO Model F-960 or approved equivalent model by Milwaukee or Crane.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ream pipes and tubes. Remove burrs, scale and dirt, inside and outside, before assembly. Remove foreign material from piping.

B. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. General

1. Care shall be exercised to avoid all cross connections and to construct the plumbing systems in a manner which eliminates the possibility of water contamination.

2. Install all materials and products in accordance with manufacturer's published recommendations. Use tools manufactured for the installation of the specific material or product.

3. Wipe all paste residue and excess solder from all solder joints.

4. Heat generated by soldering procedures shall not be transmitted to valves, copper alloy roll groove fittings, copper press fittings, no-hub clamps, or any other components installed within the piping system that may be damaged due to high temperatures. Contractor shall take all precautions necessary, including utilizing wet wrapping or allowing heated piping to cool to ambient temperature before attachment.

5. Pipe joints, no-hub clamps, flanges, unions, etc., shall not directly contact or be encased in concrete, or be located within wall, floor or roof penetrations.

6. Route piping in direct orderly manner and maintain proper grades. Installation shall conserve headroom and interfere as little as possible with use of spaces. Route exposed piping parallel to walls. Group piping whenever practical at common elevations.

7. Install piping to allow for expansion and Contraction without stressing pipe, joints or connected equipment.

8. Furnish all supports required by the piping included in this specification section.

9. Penetrations through fire rated walls, floors and partitions shall be sealed to provide a U.L. rating equal to or greater than the wall, floor or partition.

10. Seal all penetrations through floors, exterior building walls and grade beams air and water tight.

11. Each plumbing pipe projecting through roof shall be installed in accordance with Contract Specifications and Drawings. Penetrations shall be sealed air and water tight. Refer to details on Contract Drawings and coordinate with General Contractor for flashing requirements.

12. Furnish and install all necessary valves, traps, gauges, strainers, unions, etc. for each piece of equipment (including Owner furnished equipment) having plumbing connections, to facilitate proper functioning, servicing and compliance with code.

13. Provide code-approved transition adapters when joining dissimilar piping materials. Adaptors installed shall be manufactured specifically for the particular transition.

14. All piping shall have reducing fittings used for reducing or increasing where any change in the pipe sizes occurs. No bushing of any nature shall be allowed in piping.

15. Close nipples shall not be installed in plumbing piping systems.

16. Piping shall be insulated in accordance with Contract Documents.

17. Provide clearance for installation of insulation and for access to valves, air vents, drains, unions, etc.

18. Provide dielectric isolation device where non-ferrous components connect to ferrous components. Devices shall be dielectric union, coupling or dielectric flange fitting.

19. All piping shall be isolated from building structures, including partition studs, to prevent transmission of vibration and noise.

20. Isolate all bare copper pipe from ferrous building materials. “Tape is not an acceptable isolator.

D. Drainage and Vent Systems

1. Slope drainage lines uniformly at 1/4" per foot, for lines 3" and less, and 1/8" per foot for larger lines, unless noted otherwise on Contract Drawings. Maintain gradients through each joint of pipe and throughout system.

2. The size of drainage piping shall not be reduced in size in the direction of flow. Drainage and vent piping shall conform to the sizes indicated on the Contract Drawings. Waste lines from water closets shall not be smaller than four inches. Under no circumstances shall any drain or vent line below slab be smaller than two inches.

3. Unburied horizontal cast iron soil piping shall be supported at least at every other joint except that when the developed length between supports exceeds four feet, they shall be provided at each joint. Supports shall also be provided at each horizontal branch connection and at the base of each vertical rise. Supports shall be placed immediately adjacent to the joint. Suspended lines shall be braced to prevent horizontal movement. Unburied vertical cast iron soil piping rising through more than one floor level shall be supported with riser clamps at each floor level.

4. Install couplings for hubless pipe and fittings in accordance with manufacturer's published recommendations. Use pre-set torque wrench and tighten band screws as required by manufacturer’s published instructions.

5. All unburied change of direction fittings within the roof drainage system shall be braced against thrust. Bracing shall incorporate galvanized steel pipe clamps and tie rods.

6. Provide cleanouts within sanitary waste systems at locations and with clearances as required by the code, at the base of each waste stack and at intervals not exceeding 75 feet in horizontal runs.

7. Provide cleanouts at the base of each vertical downspout and at intervals not exceeding 75 feet in horizontal building storm drain. Provide clearances as required by code. Horizontal roof drain piping located above building ground floor level will not require cleanouts.

8. A removable sink or lavatory p-trap with cleanout plug shall be considered as an approved cleanout for 2” diameter pipe.

9. All interior cleanouts shall be accessible from walls or floors. Provide wall cleanouts in lieu of floor cleanouts wherever possible. A floor cleanout shall be installed only where installation of a wall cleanout is not practical.

10. Provide a wall cleanout for each water closet or battery of water closets. Locate wall cleanouts above the flood level rim of the highest water closet but no more than twenty four inches above the finished floor.

11. Coordinate the location of all cleanouts with the architectural features of the building and obtain approval of locations from the Project Architect.

12. Lubricate cleanout plugs with anti-seize lubricant before installation. Prior to final completion, remove cleanout plugs, re-lubricate and reinstall using only enough force to provide a water and gas tight seal.

13. Install trap primer supply to floor drains, hub drains and floor sinks that are susceptible to trap seal evaporation and where indicated on Project Drawings. Primer unit installation shall comply with manufacturer's published recommendations. Trap primer lines shall slope to drain at a minimum ¼” per foot.

14. Capped waste and vent connections for future extensions shall be located accessibly and not extend more than 24” from active main. Waste connections and vent connections shall be located at elevations that will allow future installation of properly sloped piping without the need to dismantle or relocate installed ductwork, piping, conduit, light fixtures, etc.

15. Unless indicated otherwise within Contract Documents, all sanitary vent pipes passing through the roof shall be provided with lead roof flashings constructed of 2-1/2 pound sheet lead with bases extending no less than ten inches on each side of the pipe. The vertical portion of the flashing shall extend upward the entire length of pipe and be turned tightly inside the pipe at least two inches and shall not reduce the inside diameter of vent pipe more than the thickness of the flashing. Lead flashings shall be furnished by Plumbing Contractor and turned over to Roofing Contractor for installation.

16. Locate all sanitary vent terminals a minimum of 25 feet horizontally from or 3 feet vertically above all air intakes, operable windows, doors and any other building openings.

17. Wastewater when discharged into the building drainage system shall be at a temperature not higher than 140°F. When higher temperatures exist, approved cooling methods shall be provided.

E. Domestic Water System

1. On each water supply line serving a plumbing fixture, item of equipment, or other device which has a water supply discharge outlet below the overflow rim, or where cross contamination may occur, provide and install an approved vacuum breaker or backflow preventer. Installation of vacuum breakers shall prevent any possible backflow through them.

2. Copper piping shall be supported at no greater than six foot intervals for piping 1-1/2" and smaller and ten foot intervals for piping 2" and larger in diameter.

3. Install all water piping to allow all piping within the system to be drained at low points.

4. Air chambers, dead-legs, or any other piping arrangement that may allow water to stagnate shall not be installed within domestic water systems. Valves installed for future connections shall not extend more than 24” from an active main.

5. Provide manufactured water hammer arrestors in water supply lines as indicated on Contract Drawings and in accordance with Standard PDI-WH201.

6. Pipe insulation shall be applied over installed freeze protection heat tracing tape.

7. Install union type fitting downstream of isolation valves at equipment connections.

8. Solder joint fittings shall not be installed within 24" of a copper press fitting.

9. Threaded adaptors shall be of the same manufacture and type as the system's copper fittings.

10. Threaded adaptors on supply stub-outs shall be installed prior to construction of wall and shall not extend more than 1" beyond wall face.

11. No joints in piping allowed under building slab.

F. Domestic Water Valves

1. Domestic water shut-off valves shall be installed where shown on Drawings, at each fixture and piece of equipment, at each branch take-off from mains, at the base of each riser, and at each battery of fixtures.

2. Install shut-off valves in accessible locations. Provide access panels where valves would otherwise be inaccessible. Coordinate quantity, size and location requirements of access panels with General Contractor.

3. Install shut-off valves with stems upright or horizontal, not inverted.

4. Where threaded valves are installed in copper piping systems special care shall be taken to avoid damaging the valve or its parts due to overheating. Install copper or bronze male adapters in each inlet of threaded valves. Sweat solder adapters to pipe prior to connecting to valve body.

5. Provide spring loaded type check valves on discharge of water pumps.

6. Provide accessible check valves in the individual cold and hot water fixture supply lines serving mixing valve type faucets or assemblies having hose connection outlets that are not equipped with integral check stops.

7. Install a shutoff valve immediately upstream of each strainer

8. Install domestic hot water return circuit balancing valves where indicated on Contract Drawings and locate a minimum of five pipe diameters downstream and three pipe diameters upstream of all fittings and/or line shut-off valves. Location of valves shall allow unobstructed access for monitoring and adjustment.

9. Adjust and set domestic hot water return circuit balancing valves to flows indicated on Contract Drawings and in accordance with valve manufacturer's published instructions. Use flow meter recommended by valve manufacturer.

10. Provide a temperature gauge, strainer, union and line shut-off valve upstream of each hot water return circuit balancing valve.

3.03 TESTING AND CLEANING

A. General

1. Equipment, material, power, and labor necessary for the cleaning, flushing, sterilization, inspection and testing of systems covered within this Specification Section shall be furnished by the Plumbing Contractor. All testing and inspection procedures shall be in accordance with Division 1 and Special Condition requirements of this Contract.

2. All new and parts of existing altered, extended, or repaired plumbing system piping shall be tested and inspected for leaks and defects. Piping being tested shall not leak nor show any loss in test pressure for duration specified.

3. In cases of minor installation and repairs where specified water and/or air test procedures are deemed impractical, Contractor shall obtain written approval from Owner's Representative to perform alternate testing and inspection procedures. Alternate testing and inspection procedures for minor installation and repairs shall include visual evaluation of installed components by Owner's Representative during a simulation of use.

4. The water utilized for tests shall be obtained from a potable source of supply.

5. Prepare testing reports. If testing is performed in segments, submit separate report for each segment, complete with diagram or clear description of applicable portion of piping. After inspection has been approved or portions thereof, certify in writing the time, date, name and title of the persons reviewing the test. This shall also include the description of what portion of the system has been approved. Obtain approval signature by Owner's Representative. A complete record shall be maintained of all testing that has been approved, and shall be made available at the job Site. Upon completion of the work, all records and certifications approving testing requirements shall be submitted to the Owner's Representative before final payment is made.

6. Verify systems are complete, flushed and clean prior to testing. Isolate all equipment subject to damage from test pressure. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. Leave piping uninsulated, uncovered and unconcealed until it has been tested and approved. Where any portion of piping system must be concealed before completion of entire system, the portion shall be tested separately as specified for the entire system prior to concealment. Contractor shall expose all untested covered or concealed piping.

7. Gauges used for testing shall have increments as follows:

    a. Tests requiring a pressure of 10 psi or less shall utilize a testing gauge having increments of 0.10 psi or less.

    b. Tests requiring a pressure of greater than 10 psi but less than or equal to 100 psi shall utilize a testing gauge having increments of 1 psi or less.

    c. Tests requiring a pressure of greater than 100 psi shall utilize a testing gauge having increments of 2 psi or less.

8. Separately test above and below ground piping.

9. Do not introduce test water into piping systems when exposure to freezing temperatures is possible.

10. Do not introduce test water into sections of piping located above existing sensitive areas and/or equipment that may be damaged or contaminated by water leakage. Coordinate with Owner's Representative to determine areas and/or equipment considered as being sensitive.

11. Defective work or material shall be reworked and replaced, and inspection and test repeated. Repairs shall be made with new materials. Pipe dope, caulking, tape, dresser couplings, etc., shall not be used to correct deficiencies.

12. The Contractor shall be responsible for cleaning up any leakage during flushing, testing, repairing and disinfecting to the original condition any building parts subjected to spills or leakage.

B. Drainage and Vent System

1. Subject gravity drainage and vent piping and joints to a vertical water column pressure of at least ten feet. If after 12 hours the level of the water has been lowered by leakage, the leaks must be found and stopped and the water level shall again be raised to the level described and the test repeated until, after a 12 hour retention period, there shall be no perceptible lowering of the water level in the system being tested. EXCEPTION: Portions of drainage and vent piping located on uppermost level of building shall be subjected to a water column pressure created by filling the system to point of overflow at roof vent terminals and roof drains. The pipes for the level being tested shall be filled with water to a verifiable and visible level as described above and be allowed to remain so for 12 hours.

2. Piping located above sensitive areas and/or equipment that may be damaged or become contaminated due to test water leakage shall be tested with air. Isolate the test section from all other sections and slowly fill pipe with oil-free air until there is a uniform gauge pressure of 5 pounds per square inch (34.5 kPa) or sufficient pressure to balance a 10-inch (254 mm) column of mercury. The air pressure shall be regulated to prevent the pressure inside the pipe from exceeding 5.0 PSIG. This pressure shall be held for a test period of at least 15 minutes. Any adjustments to the test pressure required because of changes in ambient temperature or the seating of gaskets shall be made prior to the beginning of the test period.

3. Test forced (pumped) drainage piping by plugging the end of the piping at the point of connection with the gravity drainage system and applying a pressure of 5psi (34.5 kPa) greater than the pump rating, and maintaining such pressure for 15 minutes.

4. Should the completion of these tests leave any reasonable question of a doubt relative to the integrity of the installation, additional tests or measures shall be performed to demonstrate the reliability of these systems to the complete satisfaction of the Owner's Representative.

5. Test plugs must extend outside the end of pipe to provide a visible indication for removal after the test has been completed.

6. During the Plumbing Systems Functional Performance Tests, each floor drain p-trap that has successfully passed pressure testing shall be proven clean and free of debris as follows:

   a. An inspection request shall be submitted to the Owner, identifying the quantity and location of drain(s) to be inspected.

   b. Vacuum out each floor drain p-trap in the presence of the Owner's Representative. A visual inspection of the trap shall be performed to verify that the trap is debris free.

   c. Perform a free flowing test by pouring two five gallon buckets of water down the floor drain.

   d. After the Owner's Representative has confirmed that the floor drain trap is clean and free of debris, insure that the trap is filled with water.

   e. Install Trap Primer.

   f. At the discretion of the Owner's Representative, a visual inspection of the trap utilizing a sewer scope may be required in addition to, or in lieu of, a vacuum procedure.

7. During the Plumbing Systems Functional Performance Tests, the Owner's Representative may require that any portion of the drainage, waste and vent systems installed under this Project Contract be proven undamaged, clean and free of debris. Verification of the interior condition of piping shall be accomplished utilizing a sewer scope or other method as determined by the Owner's Representative.

C. Domestic Water System

1. Subject piping system to a hydrostatic pressure of at least 200 pounds per square inch gauge, but not less than the operating pressure under which it is to be used, for a period of no less than 12 hours. During test period, all pipe, fittings and accessories in the particular piping system that is being tested shall be carefully inspected. If leaks are detected, such leaks shall be stopped and the hydrostatic test shall again be applied. This procedure shall be repeated until no leaks are detected for an entire 12 hour period. EXCEPTION: Piping located above sensitive areas and/or equipment that may be damaged or become contaminated due to test water leakage shall be tested with oil-free air in lieu of water.

2. After completion of the testing, all new and/or altered water piping systems shall be thoroughly sterilized with a solution containing not less than 50 parts per million of available chlorine. Do not exceed 150 parts per million at any time. Introduce chlorine into the supply stream at a rate sufficient to provide a uniform concentration throughout the system. All outlets shall be opened and closed several times. When the specified level of chlorine is detected at every outlet in the system, close all valves to prevent release of water from the system for 24 hours. At the completion of the 24 hour disinfection period, test every outlet for a minimum chlorine residual of fifty parts per million. This minimum residual must be present to proceed with flushing. Flush the system with clean water at a sufficient velocity until the residual chlorine detected at every outlet is within 0.2 parts per million of the normal water supply's level.

3. Sufficient samples must be taken no sooner than 24 hours after sterilization and flushing to represent the extent and complexity of the affected water system, along with a control sample to indicate municipal water quality at the time of testing. Send water samples to an accredited laboratory to perform qualitative and quantitative bacteriological analysis in accordance with AWWA C651. Contractor shall obtain written certification from the independent testing agency stating that the water samples meet Federal and State guidelines for safe drinking water. Upon satisfactory completion of all procedures, and receipt of acceptable laboratory test results, obtain written approval by Owner's representative. Failure to fully comply with the above procedures will result in a requirement to repeat the procedure until acceptable results are achieved, at no additional cost to the Owner.

4. Isolate or bypass equipment that would be detrimentally affected by disinfecting solution. Isolate all other sections of the domestic water system not being disinfected to prevent migration of chlorine.

5. Prior to injection of chlorine into the piping system, strategically place signs stating "Heavily Chlorinated Water - Do Not Drink", and protect all outlets to prevent use during disinfection and flushing procedures.

D. A bacteria test is not necessary for small scale work. However, disinfection is required. Examples of small scale work are less than 20 feet of pipe, replacement and/or installation of a sink, drinking fountain, eyewash, backflow preventer, isolation valve, etc. Disinfect individual parts, fixtures, isolation valves, pipes, etc. by swabbing with full strength bleach (5.25%) or soaking for at least 30 minutes in a 500 ppm chlorine solution. The 500 ppm solution can be made by adding one part 5.25% bleach (household bleach) to 100 parts drinking water. For example 3-1/2 ounces of bleach can be added to 2-1/2 gallons drinking water. Materials should then be thoroughly rinsed before putting into service.

3.04 TRAINING

A. Obtain services of the copper press fitting manufacturer to provide on-site training for Contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved end couplings. The manufactures representative shall periodically visit the jobsite and provide the contractor information concerning the best recommended practices in grooved product installation. A distributor's sales representative is not considered qualified to conduct the training or jobsite visit(s).

B. Obtain services of the grooved copper fitting manufacturer to provide on-site training for Contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved end couplings. The manufactures representative shall periodically visit the jobsite and provide the contractor information concerning the best recommended practices in grooved product installation. A distributor's sales representative is not considered qualified to conduct the training or jobsite visit(s).

END OF SECTION

SECTION 15430 – PLUMBING SPECIALTIES

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Provide all materials and installation for plumbing specialties within building domestic water, sanitary waste and storm drainage systems; floor drains, floor sinks, hub drains, roof drains, cleanouts, backflow preventers, vacuum breakers, pressure regulating valves, water hammer arrestors, wall hydrants, hose bibbs, trap primer units, strainers, temperature gauges, pressure gauges and other normal parts that make the systems complete, operable, code compliant and acceptable to the authorities having jurisdiction.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. Current Edition of the International Plumbing Code.

2. ANSI/NSF Standard 61 - Drinking Water System Components - Health Effects.

1.04 QUALITY ASSURANCE

1. Manufacturer’s name and pressure rating shall be permanently marked on valve body.

2. All materials shall be new, undamaged, and free of rust. Protect installed products and associated materials during progression of the construction period to avoid clogging with dirt, and debris and to prevent damage, rust, etc. Remove dirt and debris as work progresses.

3. Manufacturer Qualifications: Company shall have minimum three years documented experience specializing in manufacturing the products specified in this section.

4. Installer Qualifications: Company shall have minimum three years documented experience specializing in performing the work of this section. Installation of plumbing systems shall be performed by individuals licensed by the Louisiana Board of Plumbing Examiners as a Journeyman or Master Plumber. Installation may be performed by Apprentice Plumbers provided they are registered with the Louisiana State Board of Plumbing examiners and under direct supervision of a licensed plumber. All installation shall be supervised by a licensed Master Plumber.

1.05 SUBMITTALS

A. Product Data:

1. Provide Code and Standards compliance, component dimensions, service sizes and finishes.

B. Record Documents:

1. Manufacturer's certification documentation for backflow preventers.

2. Submit proposed location of access panels which vary from quantities or locations indicated on Contract Drawings.

3. Provide full written description of manufacturer's warranty.

4. Record actual locations of plumbing specialties installed.

C. Operation and Maintenance Data:

1. Include testing procedures for backflow preventers, adjustment procedures for water pressure regulating valves.

2. Include installation instructions, exploded assembly views. servicing requirements, inspection data, installation instructions, spare parts lists, replacement part numbers and availability, location and contact numbers of service depot, for all plumbing specialties installed

1.06 DELIVERY, STORAGE AND HANDLING

A. Accept specialties on site in shipping containers and maintain in place until installation.

B. Provide temporary protective coating and end plugs on valves not packaged within containers. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of completed system.

D. Protect all materials before and after installation from exposure to rain, freezing temperatures and direct sunlight. EXCEPTION: Materials manufactured for installation within exterior environments.

1.07 EXTRA MATERIALS

A. Provide two loose keys for each type of wall hydrant box.

B. Provide manufacturer's standard test kit for each type of backflow preventer installed.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

C. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

D. Provide plumbing specialties as indicated and scheduled on the Contract Drawings and as specified herein. All materials and work shall meet or exceed all applicable Federal and State requirements and conform to adopted codes and ordinances of authorities having jurisdiction.

E. Pressure and temperature ratings of plumbing specialties shall be suitable for the anticipated system pressures and temperatures in which they are installed.

F. All materials within domestic water distribution systems that may come in contact with the potable water delivered shall comply with ANSI/NSF Standard 61.

G. All brass and bronze plumbing specialties within domestic water distribution systems that may come in contact with the potable water delivered shall have no more than 15% zinc content.

H. Specialties of same type shall be product of one manufacturer.

2.02 ACCEPTABLE MANUFACTURERS

A. Floor Drains:	Wade, Zurn, Smith, Josam.
B. Floor Sinks:	Wade, Zurn, Smith, Josam.
C. Roof Drains:	Wade, Zurn, Smith, Josam.
D. Wall/Floor Cleanouts:	Wade, Zurn, Smith, Josam.
E. Backflow Preventers and Vacuum Breakers:	Watts Regulator, Febco, Conbraco.
F. Water Pressure Regulating Valves:	Wilkins, Watts Regulator, Cla-Val.

G. Water Hammer Arrestors:	Wade, Zurn, Smith, Josam.
H. Wall Hydrants:	Wade, Zurn, Smith, Josam.
I. Hose Bibbs:	Chicago.
J. Trap Primer Units:	As Specified Herein
K. Stainers:	Conbraco, Wilkins, Watts
L. Temperature Gauges:	Ashcroft, Trerice, Weksler
M. Pressure Gauges:	Ashcroft, Trerice, Weksler

2.03 FLOOR DRAINS

A. All floor drains shall be furnished and installed with all options and accessories required for a waterproof installation within the particular construction in which they are to be mounted.

B. Each floor drain shall be provided with a deep-seal p-trap unless noted otherwise.

C. Floor drains installed for general floor area drainage within toilet rooms and other finished spaces shall have cast iron body with flange, adjustable top and sediment bucket, integral reversible clamping collar, seepage openings, 1/2" plugged primer tap, and 6” diameter nickel bronze or stainless steel strainer with vandal proof screws.

D. Floor drains installed for general floor area drainage and light to medium flow indirect equipment discharge within mechanical rooms shall have cast iron body with plugged 1/2" primer tap, integral clamping collar, seepage openings, adjustable top and 11-1/2” diameter ductile iron loose set tractor grate.

E. Floor drains installed for non-monolithic shower stall floors shall have cast iron body with flange, adjustable top, integral reversible clamping collar, seepage openings and 5” diameter nickel bronze or stainless steel strainer with vandal proof screws.

F. All floor drains shall be as sized and scheduled on Contract Drawings.

G. Floor Drains shall be as Follows:

1. FD Restrooms and General Use): Floor drains shall have a cast iron body with adjustable 6" round nickel bronze strainer and flashing flange. Drains shall be: Jr Smith 2005-06(A), Zurn ZN415-06(A) or approved equal.

2. FD2 (Mechanical Rooms / Air Handling Rooms / Sprinkler Riser Rooms): Floor drains shall have a cast iron body with adjustable 8" round polished bronze strainer, recessed lip, and flashing flange. Drains shall be: JR Smith 2005-F37, Zurn ZN-415-7I or approved equal

3. FD3 (Main Mechanical/Equipment Room, Ground Floor.): Floor drains shall have a cast iron body with 12x12 cast iron grate, slotted sediment bucket, and flashing flange. Drains shall be: JR Smith 2630, Zurn Z-566 or approved equal.

H. All floor drains shall be equipped with trap primer connection where indicated on drawings.

2.04 BACKWATER VALVE

A. Backwater valves shall be cast iron with bronze backwater flap, adjustable cast iron body and collar, hub inlet spigot outlet. Backwater valves shall be: JR Smith 7022, Zurn Z-1095, Jonespec 76000 or approved equal.

2.05 FLOOR SINKS (FS)

A. All floor sinks shall be furnished and installed with all options and accessories required for a waterproof installation within the particular construction in which they are to be mounted.

B. Each floor sink shall be provided with a deep-seal p-trap unless noted otherwise.

C. Floor sinks installed for general floor area drainage shall have 8” round cast iron body with 3" sump, acid resistant enamel interior, aluminum dome strainer, seepage flange, membrane clamping device and 7-3/8” diameter stainless steel or nickel bronze top.

D. Floor sinks installed to receive indirect equipment discharge shall have cast iron 12" square body with 8" sump, acid resistant enamel interior, aluminum dome strainer, seepage flange, membrane clamping device and stainless steel top. Top shall be ½ or ¾ grate as scheduled on Drawings.

E. All floor sinks shall be as sized and scheduled on Contract Drawings.

2.06 HUB DRAINS (HD)

A. Hub drains shall be cast iron soil pipe manufactured hubs or hub adapters. Field cut no-hub or plain-end pipe stub-ups are not acceptable.

B. Each hub drain shall be provided with a deep-seal p-trap.

2.07 CLEANOUTS:

A. Cleanouts shall be provided where shown on the drawings and shall be the same size as the pipe on which installed except cleanouts on underground piping shall be a maximum of 4". Contractor to provide cleanouts whether indicated on drawings or not (with cast iron boxes and covers marked “CO”) every eighty (80) feet (max.) or change in direction as required by International Plumbing Code, Current Edition..

B. Cleanouts shall have cast iron body with tapered cast brass or bronze plug providing gas and watertight seal.

C. Interior floor cleanouts shall have stainless steel or nickel bronze scoriated top. Provide carpet marker when installed in areas to be covered by carpet.

D. Exterior cleanouts at grade shall have scoriated cast iron top.

E. Wall cleanouts shall be provided with stainless steel access covers of adequate size to allow rodding of drainage system. Wall cleanouts incorporating cover screws that extend completely through the access plug are not acceptable.

2.08 WATER HAMMER ARRESTORS (SHOCK ABSORBERS):

A. Nesting type bellows operated water hammer arrestor with male N.P.T. connection. Bellows and body casing made of Type 304 stainless steel. Water hammer arrestors shall be certified to the PDI WH-201 Standard and ASSE Standard 1010.

B. Arrestors shall be designed and manufactured for a maximum working temperature of 250F and maximum operating pressure of 125 P.S.I.G.

C. All arrestors shall be designed and approved for sealed wall installation without an access panel.

D. Water hammer arrestors shall be sized according to water hammer arresters standard PDI-WH-201 and as indicated on Contract Drawings.

2.09 HOSE BIBBS (HB)

A. General Areas: Provide Chicago Faucet No. 387 chrome plated brass hose bibb with ¾-inch female inlet, wall flange, tee handle and No. E27 vacuum breaker.

B. Housekeeping Mop Sinks: Provide Chicago Faucet No. 293-369COLDCP chrome plated brass hose bibb with ¾-inch female inlet, wall flange and lever handle.

2.10 FLOOR DRAIN TRAP PROTECTION INSERTS

A. Trap seal protection inserts shall only be installed where job conditions prevent the installation of water supplied trap primers.

1. Trap seal protection insert shall not be installed in drains receiving waste that may have a temperature greater than 140 degrees F.

2. Trap seal protection insert shall not be installed in drains receiving waste discharge flow of greater than 30 gallons per minute.

3. Trap seal protection insert shall not be installed in drains receiving corrosive or chemical waste.

B. Floor drain trap seal protection insert shall provide watertight seal inside the floor drain and prevent emission of sewer gas and backup of sewage.

C. Insert material shall be resistant to common cleaning solutions, lime scale and microbiological growth and incorporate a Elastomeric flexible tube that closes when water is not passing through and opens to permit water flow from an intermittent drip. Insert shall provide no restriction on water flow up to 30 gallons per minute.

D. Insert shall properly functions despite lodging of common debris such as mop strings, food residue, etc.

E. Trap seal protection insert shall be manufactured by ProSet "Trap Guard", model to suit installation.

2.11 WATER SUPPLIED TRAP PRIMER UNITS (TP)

A. Trap Priming devices that rely upon line pressure differential for activation are not allowed.

B. Electronic Trap Primers:

1. Provide model with quantity of outlets and type of mounting box as scheduled on Contract Drawings.

2. The number of traps served by a single trap priming device shall not exceed the number of header outlets provided within the device. Auxiliary distribution units are not allowed.

3. All unused header outlets shall be capped water-tight with compatible threaded fittings.

4. Each electronic trap primer device shall be provided with a readily serviceable strainer immediately upstream of the device solenoid valve.

5. Electronic trap primers shall provide 10 second water injection to traps every twenty-four hours, complete with galvanized steel box and cover, copper inlet connection, brass ball type stop valve, slow closing 24 VAC solenoid valve with integral strainer, 120-24 VAC transformer, brass atmospheric vacuum breaker, and copper waterway.

6. Electronic trap primers shall be manufactured by Zurn Z1020-CW or approved equal by Precision Plumbing Products “Prime Time”, model to suit installation.

C. Vacuum Breaker Trap Primer for use with exposed Flushometers:

1. This type of device shall not serve more than one trap.

2. One Piece, Chrome Plated Flush Connection.

3. Water Deflector to control the amount of water diverted from the flush.

4. 3/8” Elbow and Flex-bend Tube connection from Vacuum Breaker to wall.

5. Diverter Wall Flange and Fittings

6. Chrome Plated Wall Flange and Fitting to connect ½” NPT pipe.

7. High Back Pressure Vacuum Breaker.

8. One-piece Bottom Hex Coupling Nut.

9. Sloan Model VBF-72-A1

D. Trap Primer for use with Lavatory or Sink Drain Tailpiece:

1. This type of device shall not serve more than one trap.

2. Polished Chrome Plated Cast Bronze P-trap with Ground Joint Outlet.

3. Threaded Wall Tube, Slip Joint Nuts, Washers and Escutcheons.

4. 1/2" Polished Chrome Plated Bronze Primer Tube with Compression Fitting Connection at Wall.

5. Jay R. Smith Model 2698 or approved equal of a referenced acceptable manufacture.

2.12 STRAINERS

A. Strainers, 2" and smaller, bronze body, screwed ends, No. 20 mesh type 304 stainless steel screen, screwed cap with bronze blow-off valve (size to be determined by standard tap size in cap).

B. Strainers, 2-1/2" and larger, Cast iron body, isolating type flanged ends where installed in copper lines, .125" perforated type 304 stainless steel screen, flanged cap with bronze ball blow-off valve (size of blow-off valve shall be determined by standard tap size in cap). Special Note: All strainers 6" and larger shall have studs mounted in the body flange in lieu of bolts for removal of cap. Baskets for strainers 6" and larger shall have stainless steel reinforcing bands at ends to prevent collapsing.

2.13 TEMPERATURE GAUGES:

A. Thermometers shall be vapor or liquid actuated, direct-mounted, universal adjustable angle dial type with stainless steel or cured polyester powder coated cast aluminum case, stainless steel friction ring and glass window. Dial face shall be white with black figures; pointer shall be friction adjustable type. Movement shall be brass with bronze bushings. Bourdon tube shall be phosphor bronze with a brass socket.

B. Thermometer range shall be 30 - 240° Fahrenheit and have an accuracy of ±1 scale division.

C. Dial face shall be 4½" diameter where installed within eight feet of floor level and 6" diameter where installed higher than six feet above floor level. Provide remote read-out gauges for isolated or hard to access monitoring points.

D. Provide a brass or stainless steel separable thermowell for each thermometer.

E. Thermometers shall have a sensing bulb with an insertion length of roughly half of the pipe diameter; minimum insertion length shall be 2". Thermometers installed on tanks shall have a minimum insertion length of 5".

F. Where insulation thickness exceeds 2", provide proper bulb length and an extension neck separable thermowell. The extension neck shall be at least 2" long.

2.14 PRESSURE GAUGES:

A. Gauges shall comply with ASME B40.1, Grade 2A, and have ±0.5 percent of full scale accuracy, with type 304 stainless steel or aluminum case, bronze wetted parts and brass socket. Dial face shall be 3½" diameter where installed within six feet of floor level and 6" diameter where installed higher than eight feet above floor level. Dial face shall be aluminum with white background, black graduations and black markings. Pointer shall be adjustable with black finish. Provide remote read-out gauges for isolated or hard to access monitoring points.

B. Units of measure shall be in pounds per square inch (psi). The proper range shall be selected so that the average operating pressure falls approximately in the middle of the scale selected.

C. All pressure gauges shall be equipped with brass or stainless steel needle valves and pressure snubbers.

2.15 ICE MAKER CONNECTION BO**X**

A. Ice maker box shall be fully recessed flush mounted type constructed of 16 gauge steel with epoxy finish. The connection box shall include ½" FIP inlet and 1/4" O.D. outlet compression chrome plated angle valve. Supply connection shall be ½" Mpt or 5/8" sweat connection.

B. Manufacturer: Guy Gray Model BIM, Oatey 875

C. Manufacturer: Guy Gray Model T200

2.16 REFRIGERATOR VALVE BOX

A. Provide 3/8" angle supply with stop in plastic flush mounted box.

B. Manufacturer: Oatley 38811, Speciality products P4129

2.17 FIXED AIR GAPS

A. Fixed air gaps shall be:

1. ¾" – 1": Watts Series AG, JR Smith Series 3950, Zurn Series Z, Josam Series 3950

2. 1-1/4" – 4": Watts Series AG, JR Smith Series 3951, Zurn Series 1800

2.18 VACUUM BREAKERS

A. Vacuum breakers shall be the screw on vandal proof type with finish to match outlet finish - (i.e. chrome plated vacuum breakers on chrome plated hose outlets). Vacuum breakers shall be: Watts 8A, AW Cash VB101, or Nidel 34HD.

2.19 FLANGES

A. Flanges in copper tubing shall be 150 pound cast bronze, ANSI B16.24, with solder neck and raised or flat face to mate with adjacent flange, valve, fitting, or piece of equipment

B. Flanges between ferrous and non-ferrous piping shall be dielectric type as specified hereinbefore under Dielectric Adapters.

C. Flange gaskets shall be 1/16 inch non-metallic, ring type, ANSI B16.21.

D. Flange gaskets shall be carbon steel, all threaded type. Nuts shall be carbon steel hexagon type. Steel for bolts and nuts shall conform to ASTM A307, Grade A.

2.20 UNIONS

A. Unions in copper tubing shall be cast bronze, Fed. Spec. WW-U-516C, with threaded or solder joint ends to match pipe connections.

B. Unions between ferrous and non-ferrous piping shall be dielectric type as specified hereinbefore under Dielectric Adapters.

2.21 CLEAN EXISTING FIXTURES:

A. Contractor shall include in his bid to clean all existing fixtures to remain.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate cutting and forming of roof and floor construction to receive drains with General Contractor.

B. Verify location of equipment and housekeeping pads prior to installation of floor drains. Relocation due to misplacement shall be at Contractor's expense.

3.02 INSTALLATION

A. General

1. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

2. Install plumbing specialties in accordance with manufacturer's published instructions.

B. Drains and Cleanouts

1. Extreme care shall be used to set the top elevation of floor drains and floor sinks to meet the low point elevation of the finished floor.

2. Pipe connections to roof drains, above grade floor drains and floor sinks shall not directly contact or be encased in concrete.

3. Final mounting of interior cleanout top or access cover shall be set flush with the finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil.

4. Encase exterior cleanouts and underground cast iron water valve boxes within 24” x 24” x 6” thick reinforced concrete pad. Set top flush with finished grade surface.

5. Locate cleanouts with required clearance for rodding of drainage system.

6. Cleanouts on underground drainage shall have piping extended to the floor and finished with cleanout plug and removable floor plate

7. Cleanouts in vertical piping shall be roughed with centerline not more than 1'-6" above the finished floor, but high enough to clear the baseboard.

8. Contractor shall provide cleanout tees with access covers/doors at base of every sanitary sewer line and storm drain leader, no exceptions.

9. Open hub drains shall be installed as shown on the drawings and have the hub set in the floor with top 1" above the finished floor. Indirect waste piping shall terminate 2" above the top of the hub.

10. During construction all pipe openings, not being worked on, shall be plugged or capped to prevent foreign objects from entering system.

C. Water Hammer Arrestors (Hydraulic Shock Absorbers)-

1. Provide hydraulic shock absorbers in cold and hot water supply lines to each fixture branch, battery of fixtures and at each automatic, solenoid-operated or quick-closing valve serving equipment.

2. Locate and size hydraulic shock absorbers in accordance with PDI-WH-201 Standard and manufacturer’s published recommendations.

END OF SECTION

SECTION 15440 – PLUMBING FIXTURES

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. This section includes the furnishing of all labor and materials necessary for a complete installation of all plumbing fixtures indicated on the Drawings and specified herein.

B. Plumbing Contractor shall furnish and install plumbing fixtures as shown on the accompanying drawings and in accordance with the approved rough in drawings. This will include service sinks, lavatories, water closets, urinals, etc., with all brass in connections with supply with tubing, traps, escutcheons, stop and basin cocks, etc. All fixtures shall be new and must be delivered to the building properly crated and in perfect condition.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. Current Edition of the International Plumbing Code

2. Americans with Disabilities Act, 28 CFR Part 35 Nondiscrimination on the Basis of Disability in State and Local Government Services, Final Rule, as published in the Federal Register

3. ICC/ANSI A117.1, "Accessible and Usable Buildings and Facilities" relative to plumbing fixtures for people with disabilities

4. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water

5. ANSI/ASME A112, Plumbing Standards

1.04 PRODUCTS NOT FURNISHED BUT INSTALLED UNDER THIS SECTION

A. Rough-in for and make final connection to Owner furnished fixtures and equipment requiring plumbing services.

B. Rough-in for and make final connection to fixtures and equipment furnished under other divisions of these Contract Specifications requiring plumbing services.

1.05 QUALITY ASSURANCE

A. Fixtures, trim, accessories and carriers of any one type shall be by the same manufacturer throughout.

B. All fixtures and trim shall be new, institutional/commercial quality and free from mars, chips, scratches, blemishes or any defects.

1.06 SUBMITTALS

A. Product Data:

1. Provide manufacturer's data sheets indicating Code and Standards compliance, illustrations of fixtures, physical sizes, rough-in dimensions, utility sizes, trim and finishes.

B. Record Documents:

1. Provide full written description of manufacturer's warranty.

2. Manufacturer's installation instructions.

C. Operation and Maintenance Data:

1. Include installation instructions, exploded assembly views. servicing requirements, inspection data, installation instructions, spare parts lists, replacement part numbers and availability, location and contact numbers of service depot, for all plumbing specialties installed.

1.07 DELIVERY, STORAGE AND HANDLING

A. Accept fixtures on Site in factory packaging. Inspect for damage.

B. Protect all fixtures and trim before and after installation from exposure to rain, freezing temperatures and direct sunlight. EXCEPTION: Materials manufactured for installation within exterior environments.

C. Protect installed fixtures and trim from damage and/or entry of foreign materials by temporary covers during the construction phase of this project.

D. Do not allow use of installed fixtures and trim for any reason, other than testing, during the construction phase of this project.

1.08 EXTRA MATERIALS

A. Provide two service kits for each type of faucet, flush valve, shower/tub valve and all other trim/accessories having serviceable parts.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are either as indicated on Shop Drawings or as instructed by the manufacturer. Designate within submittals that measurements have been verified, and note which measurements are the basis for construction.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C.	Stainless Steel Sinks:	Just, Elkay
D.	Mop Sinks:	Crane/Fiat, Stern Williams
E.	Drinking Fountains:	Oasis, Sunroc, Elkay, Halsey Taylor
F.	Vitreous China Water Closets:	American Standard, Kohler, Crane, Eljer
G.	Vitreous China Clinical Flushing Rim Sinks:	American Standard, Kohler, Crane, Eljer
H.	Vitreous China Urinals:	American Standard, Kohler, Crane, Eljer
I.	Vitreous China Lavatories:	American Standard, Kohler, Crane, Eljer
J.	Cast Iron Bathtubs:	American Standard, Kohler, Crane, Eljer
K.	Manual Lavatory/Sink Faucets:	Chicago
L.	Manual Laboratory Sink Faucets:	Chicago, WaterSaver
M.	Electronic Lavatory/Sink Faucets (DC Powered):	Chicago "HyTronic"
N.	Electronic Lavatory/Sink Faucets (AC Powered):	Chicago "HyTronic"
O.	Manual Flush Valves:	Sloan "Royal" or Zurn "AquaVantage"
P.	Manual Flush Valves with Bedpan Washer:	Sloan "Royal" or Zurn "AquaVantage"

Q.	Shower/Bathtub Mixing Valves:	Chicago "Tempshield", Powers "Hydroguard"
R.	Shower Heads/Hand Sprayer:	Chicago, Powers, Leonard, Speakman
S.	Bedpan Washers (Hand held):	Chicago
T.	Fixture Stops & Supplies:	Chicago
U.	Fixture Traps:	Chicago, McGuire
V.	Toilet Seats:	Church, Bemis, Olsonite
W.	Fixture Carriers:	Wade, Josam, Zurn, Smith
X.	A.D.A. Insulation Kits:	Mcguire, Truebro, Plumberex

2.02 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Provide plumbing fixtures as indicated and scheduled on the Contract Drawings and as specified herein.

C. Fixtures, trim and accessories of any one type shall be by the same manufacturer.

D. All vitreous china fixtures shall be white in color unless noted otherwise on Drawings.

E. All plumbing fixture trim within public toilet rooms shall be furnished with vandal-proof trim.

F. All exposed brass fixture trim shall be heavily chrome plated.

G. Fittings and piping shall be brass and, wherever exposed, shall be polished chrome-plated. Provide tight fitting wall or floor escutcheons of chrome-plated brass or stainless steel wherever pipes pass through floors, walls or ceilings.

H. Fixture supplies shall be loose key angle stops with 1/2" I.P.S. female inlets and shall include wall flanges and brass risers. All components shall be chrome plated. In all cases, all piping, tubing, fittings and faucets shall be installed using mechanical non-slip connections, such as bull-nose, flanged, ferrule or threaded fittings. Fittings requiring a friction fit using slip-on or gasket connections are not acceptable. [EXCEPTION: Hose type riser supplies are acceptable when supplied and required by the fixture manufacturer]. Supply riser tubing for lavatories and sinks shall be minimum 3/8" O.D.

I. Provide A.D.A. compliant molded insulation on exposed water and drain piping beneath handicap accessible lavatories and sinks. Insulation shall be designed to allow removal and re-installation for pipe servicing.

J. Unless noted otherwise, install each lavatory, sink and drinking fountain with chrome-plated, 17 gauge trap with cleanout plug that is easily removable for servicing and cleaning. Slip joints shall be permitted only on the fixture trap inlet, within the trap seal and at outlet connection to the trap adapter.

K. Wall mounted water closets, lavatories, urinals and drinking fountains shall be supported with commercial carriers bolted to floor, model to suit installation. Provide concealed arm type carriers for lavatories.

L. All brass must be best quality. All brass pipe to be seamless brass tubing and all fixture traps shall be heavy with C.O. plugs. Nipples shall be extra heavy. Lightweight goods will not be accepted.

M. All exposed metal on fixtures shall be C.P. or Chromard. All "P" traps shall be complete with cleanout plug.

N. Plumbing contractor shall submit in his fixture brochure for approval, a rough in sheet of each fixture and indicate any variation required for the fixtures. Fixtures are to be roughed in accordance with these approved rough-in sheets and anchored so that piping cannot be moved.

O. Plumbing Contractor shall furnish and install plumbing fixtures as shown on the accompanying drawings and in accordance with the approved rough in drawings. This will include service sinks, lavatories, water closets, urinals, etc., with all brass in connections with supply with tubing, traps, escutcheons, stop and basin cocks, etc. All fixtures shall be new and must be delivered to the building properly crated and in perfect condition.

P. Check millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

Q. All fixtures shall have supplies with stops. Stops shall be chrome plated brass. Trim shall be polished, chrome plated brass, same manufacturer as fixture unless otherwise indicated. All pipe, fittings, etc. in connection with supply or drain trim shall be chrome plated. In cases where fixtures may have hot and cold water trim without hot water service, connect cold water to both trim inlets.

R. Rough-in locations shall be carefully spotted to result in a symmetrical pattern with sufficient spacing to accommodate full escutcheons.

S. Trap separately each fixture and piece of equipment requiring connection to drainage, unless otherwise shown on drawings. Place traps as near to the fixture as possible. Not fixture shall be double trapped. Unless indicated otherwise, drain "P" traps shall be polished, chrome plated cast brass with cleanout plug and 17 gauge tubular outlet to wall. For floor drains, hub drains or other similar devices with under floor traps, drain "P" traps shall be same material as the branch piping system.

T. All plumbing fixtures, materials, and units shall conform to all applicable standards (ANSI/NSF, ASME, ASSE, ASTM, etc.) as required by the International Plumbing Code, Current Edition.

U. All low water consumption fixtures and flush valve to be provided by the same manufacturer.

V. Fixtures shall have flow control devices to limit the flow of water to a maximum rate in accordance with the following table:

FIXTURE	MAXIMUM WATER USAGE
Patient Shower Valve or Head	2.5 GPM (at 80 psi)
Non-Patient Shower Valve or Head	2.0 GPM (at 80 psi)
Staff Lavatory Faucet	2.2 GPM (at 60 psi)
Public Toilet Room Lavatory Faucet	0.5 GPM (at 60 psi)
Sink Faucet	2.2 GPM (at 60 psi)
Water Closet	1.28 Gallons Per Flush
Urinal	0.25 Gallon Per Flush

W. Stainless Steel Sinks

1. Stainless steel sinks shall be 18 gauge, Type 304 stainless steel with insulation undercoating, refer to schedule for type and size.

2. Provide stainless steel covers for all unused sink faucet/accessory holes. Covers shall be secured with stainless steel bolt and wing nut. Snap-in type covers are not acceptable. Covers shall provide a watertight seal by utilizing rubber gasket or plumbers putty.

3. Sink strainer shall be 316 stainless steel.

4. See Plumbing Fixture Schedule on drawings for style and type.

X. Housekeeping Mop Sinks

1. Provide mop as scheduled on Contract Drawings

2. Receptor shall be precast terrazzo composed of marble chips and Portland cement, ground smooth, grouted and sealed to resist stains.

3. Stainless steel caps shall be cast integral on all curbs.

4. Shoulders shall not be less than 9-3/4" high inside (12” high outside) measurement, and not less than 1-1/4" wide. Drop front shoulders shall have 6” high outside measurement.

5. Tiling flanges shall be cast integral and extend 1" above shoulder on 1, 2 or 3 sides (as required per Project).

6. Drain shall be cast brass with stainless steel strainer cast integral and shall provide for a code compliant connection to a 3" pipe.

7. See Plumbing Fixture Schedule on drawings for style and type.

Y. Water Closets

1. Water closets shall be vitreous china, floor mount and/or wall-mounted elongated bowl having siphon jet flushing action design, refer to plumbing schedule to type.

2. Water closet bowls installed within non-ambulatory patient toilet rooms shall be furnished with slotted rim for bedpan holding.

3. Water closet bowl gaskets shall be neoprene, felt gaskets and wax rings are not permitted.

4. Wall mounted water closets shall be supported with extra-heavy duty commercial carriers bolted to floor and rated for a 500 pound load. Carrier model shall be designed for the actual fixture being supported and provided with all options and accessories manufactured by the carrier manufacturer for a complete installation. Provide auxiliary foot support as recommended by the manufacture to prevent bending of fixture support stud bolts.

5. Water closet seats shall be commercial/institutional grade, white in color, have open front and stainless steel self-sustaining check hinges.

6. See Plumbing Fixture Schedule on drawings for style and type.

Z. Flush Valves

1. All electronic flush valves shall be provided with manual override activators. EXCEPTION: Flush valves located within specimen collecting toilet rooms shall be hard-wired without manual override activator.

2. AC powered electronic flush valves located within Patient Care areas and critical Research areas shall be connected to the emergency electrical system.

3. Flush valves in non-ambulatory patient toilet rooms shall be manually operated and have integral bedpan washer.

4. See Plumbing Fixture Schedule on drawings for style and type

AA. Faucets

1. Provide faucets with laminar flow outlets. Aerators shall not be acceptable. Faucet flow control devices shall be located at the spout outlet.

2. Provide vacuum breakers for all faucets that have threaded or serrated hose connection outlets (including laboratory pure water faucets).

3. Gooseneck spout outlets shall terminate five inches minimum and five & one half inches maximum above top rim of lavatory or sink. Horizontal dimension from spout inlet to spout outlet shall be a minimum five & one half inches.

4. Provide integral hot and cold water inlet check stops in all mixing type sink faucets that have hose connection outlets.

5. All non-public use electronic faucets shall be designed and manufactured to allow continuous water flow during usage for at least sixty seconds after initial activation.

6. All electronic lavatory faucets located within public toilet rooms shall be designed and manufactured to allow continuous water flow during usage for a maximum duration of ten seconds after initial activation.

7. AC powered electronic faucets located within Patient Care areas and critical Research areas shall be connected to the emergency electrical system.

8. All lavatory faucets within non-patient room toilets shall have low-profile (non-gooseneck) spouts and electronic sensor activation.

9. Lavatory faucets within patient rooms shall have gooseneck spouts and manually activated four-inch wrist blade operation.

10. See Plumbing Fixture Schedule on drawings for style and type.

BB. Shower and Bathtub Mixing Valves

1. Shower and bathtub mixing valves shall be ASME A112.18.1M, CSA B125, ASSE 1016 and ADA compliant, having combination thermostatic/pressure balancing replaceable cartridge, integral check valves, integral stops and high temperature limit set at 110° F.

2. Thermostatic/pressure balance mixing valves shall have brass body construction with polished chrome plated finish, lever control handles for volume and temperature, and 1/2" NPT connections.

3. Provide showerheads, tub spouts, hand-held shower systems, diverters, vacuum breakers and other trim accessories as scheduled on Contract Drawings.

4. See Plumbing Fixture Schedule on drawings for style and type.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Confirm that millwork is constructed with adequate provision for the installation of countertop lavatories, sinks, faucets and related trim and accessories.

C. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes required by code, as recommended by the manufacturer, and as indicated in Contract Drawings fixture rough-in schedule.

3.03 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Furnish and install all labor, materials, equipment, tools and services and perform all operations required in connection with or properly incidental to the installation of complete plumbing fixtures, as indicated on Contract Drawings, reasonably implied therein or as specified herein, unless specifically excluded.

D. Each piece of trim shall be furnished whether specifically mentioned or not, in order to provide a complete first-class installation. Furnish and install all required water, waste, soil and vent connections to all plumbing fixtures, together with all fittings, supports, fastening devices, cocks, valves, traps, etc., leaving all in complete working order.

E. Provide accessible check valves in the individual cold and hot water fixture supply lines serving mixing valve type faucets or assemblies having hose connection outlets that are not equipped with integral check stops.

F. Coordinate mounting heights of plumbing fixtures with architectural details/elevations.

G. Install A.D.A. compliant water closet flush valve handles on wide side of toilet stalls.

H. Install fixtures and trim in accordance with manufacturer's instructions.

I. All exposed chrome plated, polished or enameled fixtures and trim shall be installed with special care, leaving no tool marks on finishes. Install flexible brass fixture supply risers using manufactured tube bending tools. Bending tubes only with the use of hands shall not be permitted.

J. Install each fixture trap, easily removable for servicing and cleaning.

K. Provide chrome-plated deep escutcheons where required to cover non-chrome-plated piping projecting through walls.

L. Thoroughly fill spaces between fixtures and walls, countertops and/or floors with waterproof, mold resistant, non-toxic, non-shrinkable white tile caulking.

M. Install components firmly fixed, level and plumb.

N. Install and secure all wall mounted fixtures in place with commercial carriers and bolts in accordance with manufacturer's instructions. Fixture weight shall not be transmitted to walls, partitions or service piping. Installation shall prevent any movement of fixture during use.

O. All non-monolithic shower floors shall be provided with drain pan attached to floor drain flange in accordance with the latest edition of the Uniform Plumbing Code. Refer to Architectural Contract Specifications and Drawings for pan materials and additional installation requirements.

P. At each toilet on plan provided with a floor drain (or drains), provide a trap primer assembly as specified herein at the handicapped water closet installation and extend a trap primer supply line to floor drain or trap connection in accordance with the manufacturer's recommendations.

Q. All flush valves installed on handicapped water closet (ADA) shall be installed with handle to wide side of toilet.

R. Contractor shall provide copper plated bracket between wall stubs to anchor water piping for flush valves for both water closets and urinals. Contractor shall spot solder water pipe to bracket.

S. Contractor to provide offset on flush valve vertical supply piping at base of water closet to offset and not to conflict with ADA grab bars.

T. All hardware utilized to secure plumbing fixtures is to be stainless steel. Submit product cut sheet to A/E for review prior to installation.

3.04 INTERFACE WITH OTHER PRODUCTS AND TRADES

A. Review millwork Shop Drawings. Confirm location and size of fixtures and openings before rough-in and installation.

B. Provide templates for all fixtures to be mounted in millwork to General Contractor.

C. Coordinate with Electrical Contractor and insure proper power is provided for electric drinking fountains, sensor operated faucets and sensor operated flush valves

3.05 TESTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise or overflow.

B. Adjust and set sensor faucet mixing valves to provide desired water temperature at spout outlet.

C. Insure that all traps are filled with water and maintain trap seal. Each fixture shall be filled and then drained. Traps and fixture connections shall be proven water tight by visual inspection.

D. After fixtures have been installed and water systems are pressurized, test each fixture and associated trim for proper operation and inspect for leaks. Replace malfunctioning fixtures and components, then retest. Repeat procedure until all components operate properly.

E. Test drain pans installed for non-monolithic shower floors prior to installation of finished flooring. Fill pan with water to within 1” of top. Pan must maintain test water level without leakage for at least eight hours

3.06 CLEANING

A. Thoroughly clean all plumbing fixtures and equipment furnished under this Contract prior to final acceptance.

B. Thoroughly flush and clean all faucet spout outlet screens and flow control devices.

3.07 PROTECTION OF FINISHED WORK

A. Do not permit use of fixtures until after Substantial Completion has been announced by Owner.

3.08 FIXTURE ROUGH-IN SCHEDULE

A. Rough-in fixture piping and size connections shall be in accordance with the following table of minimum sizes for particular fixtures unless noted different on the drawings:

WATER PIPE SIZING TABLE

UNLESS SHOWN OTHERWISE, DOMESTIC WATER LINES SHALL RUN CONCEALED OVERHEAD AS DESIGNATED IN PLUMBING FIXTURE SCHEDULE AND BE SIZED ACCORDING TO TABLE BELOW. PLANS AND RISER DIAGRAMS DO NOT NECESSARILY SHOW ALL PIPING RUNS. INSTALL A FACTORY SHOCK ABSORBER AT TOP OF EACH FIXTURE GROUP AND ALSO AT WATER HEATERS.

NUMBER OF FIXTURES	PIPE SIZE (IPS)
2 or Less	½"
3 to 5	3/4"
6 to 10	1"
11 to 15	1-1/4"
16 to 28	1-1/2"

*FLUSH VALVE WATER CLOSET IS EQUIVALENT TO SIX (6) FIXTURES

B. 1. SIZES INDICATED ABOVE ARE MINIMUM SIZES TO BE USED UNLESS OTHERWISE SPECIFIED DIFFERENT

END OF SECTION

SECTION 15622 - AIR HANDLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Indoor Air Handling Units.

1.02 REFERENCES

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. AMCA 99 - Standards Handbook.

C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.

D. AMCA 300 - Test Code for Sound Rating Air Moving Devices.

E. AMCA 500 - Test Methods for Louver, Dampers, and Shutters.

F. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.

G. AHRI 430 - Central-Station Air-Handling Units.

H. AHRI 435 - Application of Central-Station Air-Handling Units.

I. ASTMB117 - Standard Practice for Operating Salt Spray Apparatus.

J. NEMA MG1 - Motors and Generators.

K. NFPA 70 - National Electrical Code.

L. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

M. UL 723 - Test for Surface Burning Characteristics of Building Materials.

N. UL 900 - Test Performance of Air Filter Units.

O. UL 1995 - Standard for Heating and Cooling Equipment.

P. UL 94 - Test for Flammability of Plastic Materials for Parts in Devices and Appliances.

Q. IBC 2000, 2003 - International Building Code.

R. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

S. NFPA 5000 - Building Construction and Safety Code.

T. ASHRAE 90.1 Energy Code.

U. AHRI Standard 1060 - Rating Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment.

V. GSA 2003 Facilities Standard - 5.9 HVAC Systems and Components.

1.03 SUBMITTALS

A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements. Computer generated fan curves for each air handling unit shall be submitted with specific design operating point noted. A computer generated psychometric chart shall be submitted for each cooling coil with design points and final operating point clearly noted. Sound data for discharge, radiated and return positions shall be submitted by octave band for each unit. Calculations for required baserailheights to satisfy condensate trapping requirements of cooling coil shall be included.

B. Product Data:

1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, finishes of materials, electrical characteristics, and connection requirements.
2. Provide data of filter media, filter performance data, filter assembly, and filter frames.
3. Provide manufacturer's installation instructions.

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Air Handler products specified in this section must show a minimum five years documented experience and complete catalog data on total product.

1.05 SAFETY AGENCY LISTED & CERTIFICATION

A. Air Handling units shall be cETLus safety listed to conform with UL Standard 1995 and AN/CSA Standard C22.2 No. 236. Units shall be accepted for use in New York City by the Department of Building, MEA 342-99-E.

B. Air handler furnished with double width, double inlet (DWDI) fans and/or plenum fans where applicable, shall be certified in accordance with the central station air handling units certification program, which is based on AHRI Standard 430. (NOTE: Above does not apply to fan array)

C. Air handling unit water heating & cooling coils shall be certified in accordance with the forced circulation air cooling and air heating coils certification program, which is basedon AHRI Standard 410.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept products on site on factory-furnished shipping skids. Inspect for damage.

C. Store in clean dry place and protect from construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. The following manufacturers are approved for use and suitable for variable air volume (VAV) operation. No substitutions will be permitted.
   1. Daikin
   2. Trane
   3. Jonson Controls

2.02 GENERAL DESCRIPTION

A. Configuration: Fabricate as detailed on drawings.

B. Performance: Conform to AHRI 430. See schedules on prints. (NOTE: above does notapply to fan array)

C. Acoustics: Sound power levels (dB) for the unit shall not exceed the specified levels shown on the unit schedule. The manufacturer shall provide the necessary sound treatment to meet these levels if required.

2.03 UNIT CONSTRUCTION

A. Fabricate unit with heavy gauge channel posts and panels secured with mechanical fasteners. All panels, access doors, and ship sections shall be sealed with permanently applied bulb-type gasket. Shipped loose gasketing is not allowed.

B. Panels and access doors shall be constructed as a 2-inch nominal thick; thermal broke double wall assembly, injected with foam insulation with an R-value of not less than R-13.
   1. The inner liner shall be constructed of G90 galvanized steel.
   2. The outer panel shall be constructed of G90 galvanized steel.
   3. The floor plate shall be constructed as specified for the inner liner.
   4. Unit will be furnished with solid inner liners.

C. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 5 inches of positive or 6 inches of negative static pressure. Deflection shall be measured at the panel midpoint.

D. The casing leakage rate shall not exceed .5 cfm per square foot of cabinet area at 5 inches of positive static pressure or 6 inches of negative static pressure (.0025 m3/s per square

meter of cabinet area at 1.24 kPa static pressure).

E. Module to module field assembly shall be accomplished with an overlapping, full perimeter internal splice joint that is sealed with bulb type gasketing on both matingmodules to minimize on-site labor and meet indoor air quality standards.

F. Access doors shall be flush mounted to cabinetry, with minimum of two six inch longstainless steel piano-type hinges, latch and full size handle assembly. Access doors shall swing outward for unit sections under negative pressure. Access doors on positivepressure sections, shall have a secondary latch to relieve pressure and prevent injury upon access.

G. A 6-inch formed G60 galvanized steel base rail shall be provided by the unitmanufacturer for structural rigidity and condensate trapping.. The base rail shall be constructed with 12-gauge nominal for unit sizes 003 - 035 and 10-gauge nominal for unit sizes 040 - 090. The following calculation shall determine the required height of the baserail to allow for adequate drainage. Use the largest pressure to determine base rail height. [(Negative)(Positive) static pressure (in)] (2) + 4” = required baserail height. Should the unit baserail not be factory supplied at this height, the contractor is required to supply a concrete housekeeping pad to make up the difference.

H. Construct drain pans from stainless steel with cross break and double sloping pitch to drain connection. Provide drain pans under cooling coil section. Drain connection centerline shall be a minimum of 3’’ above the base rail to aid in proper condensate trapping. Drain connections that protrude from the base rail are not acceptable. There must be a full 2’’ thickness of insulation under drain pan.

2.04 FAN ASSEMBLIES

A. Acceptable fan assembly shall be a double width, double inlet, class II, belt-drive type housed airfoil fan dynamically balanced as an assembly, as shown in schedule. Maximum fan RPM shall be below first critical fan speed. Fan assemblies shall be dynamically balanced by the manufacturer on all three planes and at all bearing supports. Copper lubrication lines shall be provided and extend from the bearings and attached with grease fittings to the fan base assembly near access door. If not supplied at the factory, contractor shall mount copper lube lines in the field. Fan and motor shall be mounted internally on a steel base. Provide access to motor, drive, and bearings through hinged access door.

B. Fan and motor shall be mounted internally on a steel base. Factory mount motor on slide base that can be slid out the side of the unit if removal is required. Provide access to motor, drive, and bearings through hinged access door. Fan and motor assembly shall be mounted on 2" deflection spring vibration type isolators inside cabinetry.

2.05 BEARINGS, SHAFTS, AND DRIVES

A. Bearings: Basic load rating computed in accordance with AFBMA - ANSI Standards. The bearings shall be designed for service with an L-50 life of 200,000 hours and shall be a heavy duty pillow block, self-aligning, grease-lubricated ball or spherical

roller bearing type.

B. Shafts shall be solid, hot rolled steel, ground and polished, keyed to shaft, and protectively coated with lubricating oil. Hollow shafts are not acceptable.

C. V-Belt drives shall be cast iron or steel sheaves, dynamically balanced, bored to fit shafts nd keyed. Fixed sheaves, matched belts, and drive rated based on motor horsepower. Minimum of 2 belts shall be provided on all fans with 10 HP motors and above. Standard drive service factor minimum shall be 1.1 S.F. for 1/4 HP – 7.5 HP, 1.3 S.F. for 10 HP and larger, calculated based on fan brake horsepower.

2.06 ELECTRICAL

A. Fan motors shall be manufacturer provided and installed, Open Drip Proof, premiumefficiency (meets or exceeds EPAct requirements), 1750 RPM, single speed, see schedule for electrical. Complete electrical characteristics for each fan motor shall be as shown in schedule.

B. The air handler(s) shall be ETL and ETL-Canada listed by Intertek Testing Services, Inc. Units shall conform to bi-national standard ANSI/UL Standard 1995/CSA Standard C22.2 No. 236.

C. Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.

D. Manufacturer shall provide ASHRAE 90.1 Energy Efficiency equation details for individual equipment to assist Building Engineer for calculating system compliance.

E. Installing contractor shall provide GFI receptacle within 25 feet of unit to satisfy National Electrical Code requirements.

F. All electrical connection components shall be field provided and mounted as shown on project schedule.

2.07 COOLING COILS

A. Certification: Acceptable water cooling, water heating, steam, and refrigerant coils shall be certified in accordance with AHRI Standard 410 and bear the AHRI label. Coils exceeding the scope of the manufacturer's certification and/or the range of AHRI's standard rating conditions will be considered provided the manufacturer is a current member of the AHRI Forced Circulation Air-Cooling and Air-Heating Coils certification programs and that the coils have been rated in accordance with AHRI Standard 410. Manufacturer must be ISO 9002 certified.

B. Direct expansion refrigerant cooling coil shall be provided. Provide access to coil(s) for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 3" beyond unit

casing for ease of installation. Coil connections must be factory sealed with grommets on interior and exterior panel liners to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.

1. Sweat type copper suction headers shall be provided.
2. Fins shall have a minimum thickness of 0.0075 inch aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.
3. Coil tubes shall be 5/8 inch OD seamless copper, 0.020 inch nominal tube wall thickness, expanded into fins on 1 1/2-inch centers, brazed at joints.
4. Sweat type copper suction connections located at the bottom of the suction headers for gravity oil drainage. Coils shall be uniformly circuited in a counterflow manner for either single circuit, row, face, interlaced, or interlaced face split capacity reduction as shown on unit schedule. Pressure type liquid distributors used. Coils shall be tested with 315 pounds air pressure under warm water, and suitable for 250 psig working pressure.
5. Coil casing shall be a formed channel frame of stainless steel.

2.08 FILTERS

A. Furnish flat panel filter section with 2-inch filter. Provide side loading and removal of filters.

B. Filter media shall be UL 900 listed, Class I or Class II.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer’s Installation & Maintenance instructions.

3.02 ENVIRONMENTAL REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 15670 - CONDENSING UNIT

PART 1 GENERAL

1.01 Section Includes:

A. Semi-custom packaged rooftop air conditioners

1.02 SUBMITTALS

A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.

B. Product Data:
   1. Provide literature that indicates dimensions, weights, capacities, ratings, and electrical characteristics and connection requirements.

1.03 OPERATION AND MAINTANENCE DATA

A. Maintenance Data: Provide instructions for installation, maintenance and service

1.04 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.

B. Startup must be done by trained personnel experienced with split systems.

B. Do not operate units for any purpose, temporary or permanent, until remote controls are in place, and manufacturers' installation instructions have been followed.

1.05 DELIVERY, STORAGE, HANDLING

A. Deliver, store, protect and handle products to site.

B. Handle carefully to avoid damage to components, enclosures, and finish

C. Store in a clean, dry place to protect from weather and construction traffic.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Trane
B. Daiken
C. Jonson Controls

2.02 GENERAL DESCRIPTION

A. Furnish as shown on plans, Condensing Unit(s). Unit performance and electrical characteristics shall be per the job schedule and suitable for variable volume (VAV) operation..
B. Configuration: Fabricate as detailed on prints and drawings.
C. The complete unit shall be listed.

D. Unit shall be completely factory assembled and shipped in one piece.

E. Unit to be shipped with a nitrogen holding charge only.

F. The unit shall undergo an operational test prior to shipment. The factory test shall include a refrigeration circuit check test, a unit safety control system operations checkout, and a final unit inspection.

G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

H. Performance: All scheduled capacities and face areas are the minimum accepted value. scheduled amps, KW, and HP are maximum accepted values that allow scheduled capacity to be met.

2.03 CABINET

A. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished surface to withstand a minimum 750-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.

B. Lifting brackets shall be provided on the unit base with lifting holes to accept cable or chain hooks.

2.04 ELECTRICAL

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with unit shall be number and color coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch circuit short circuit protection, 115 volt control circuit transformer and fuse, system switches, and a high temperature sensor. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Knockouts shall be provided in the side of the main control panels for field wiring entrance. All 115-600 volt internal and external wiring between control boxes and components shall be protected from damage by raceways or conduit.

B. The receptacle shall be powered by a field supplied 115V source.

C. Single terminal block shall be provided for connecting electrical power at the unit.

D. Unit SCCR rating to be 10 kAIC.

E. Unit shall be provided with a 24 volt transformer and terminal strip for field supplied controls.

2.05 CONDENSING SECTION

A. Air Cooled Condenser
   1. Units shall have at least one head pressure sensing condenser fan controlled to maintain positive head pressure.
   2. The condensing section shall be open on the sides and bottom to provide access and to allow airflow through the coils. Condenser coils shall be multi-row and fabricated from cast aluminum micro-channel coils. Each condenser coil shall be factory leak tested with high-pressure air under water. Coils are to be recessed so that the cabinet provides built in hail protection.
   3. Condenser fans shall be direct drive, propeller type designed for low tip speed, vertical air discharge, and include service guards. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, inherently protected, three-phase, non-reversing type with permanently lubricated ball bearing and integral rain shield. Unit to be equipped with condenser fan low ambient speed sensor control.

B. Scroll Compressors
   1. Each unit shall have multiple, heavy-duty Copeland scroll compressors.
   2. Each compressor shall be complete with gauge ports, crankcase heater, sight-glass, anti-slug protection, motor overload protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure.
   3. Compressors shall be isolated with resilient rubber isolators to decrease noise transmission.

C. Refrigeration Circuit
   1. Each unit shall have two independent refrigeration circuits. Each circuit shall be complete with low pressure control, liquid line charging valve with a 3/8" charging port, a manual reset high pressure safety switch. Each circuit shall be dehydrated and leak tested. Unit shall have discharge and suction line shutoff valves.
   2. Each circuit shall be dehydrated and factory charged with 410-A Refrigerant and oil. Refrigeration capacity control shall be accomplished by staging of the unit's multiple compressors. All compressor capacity control staging shall be controlled by the factory installed main unit control system.

D. Hot gas bypass capped T shall be factory installed on the discharge line of refrigerant circuits.

E. All condensing units to be utilized with variable air volume control. Units shall come

equipped with Honeywell W7100A discharge air controller with factory supplied, field installed discharge air sensor, or approved equal. Provide preventative coil frost protection for compressor unloading based on refrigerant circuit suction temperature to prevent coil frosting with minimum energy usage. If condensing unit controls are field provided, then unit manufacturer shall provide appropriately sized hot gas bypass, including isolation ball valves and check valve.

F. Unit to be equipped with condenser fan low ambient speed sensor control.

G. Contractor shall provide additional hot gas line, including insulation. Unit manufacturer shall provide recommended piping diagram based on field conditions.

2.06 CONTROLS

A. The control shall be a centralized microprocessor with indoor and outdoor temperature sensors that drive algorithms, making decisions for all heating, cooling, and ventilation.

B. The control shall have have an integrated anti-short-cycle timer and integrated time delay between compressors.

C. Connectors shall be colored and keyed with colored wires.

D. Provide RAWAL HGBP valves for field mounting, VAV operation.

2.07 BUILDING MANAGEMENT SYSTEM

A. Unit shall be provided with BACnet communication ability, able to communicate with BACnet IP or BACnet MS/TP.

1. BACnet option is to be factory installed.

2.08 WARRANTY

A. The manufacturer shall provide complete five year warranty (parts and labor). Defective parts will be repaired or replaced during the warranty period at no charge. The warranty period shall commence at official acceptance of project.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instruction

END OF SECTION

SECTION 15815 – DUCTWORK

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Provide materials and installation for complete first class HVAC systems; install ductwork, flexible duct, hangers, supports, sleeves, flashings, vent flues, and all necessary accessories as indicated in the Contract Documents. Provide any supplementary items necessary for proper installation that make the systems operable, code compliant and acceptable to the authorities having jurisdiction.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. ASHRAE - Handbook of Fundamentals; Duct Design.

2. ASHRAE - Handbook of HVAC Systems and Equipment; Duct Construction.

3. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.

4. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

5. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

6. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

7. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.

8. ASTM B209 - Aluminum and Aluminum Alloy Sheet and Plate.

9. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
10. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
11. NFPA 96 - Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooling Equipment.
12. NFPA 45 – Laboratory Ventilating Systems and Hood Requirements.
13. SMACNA – HVAC Duct Construction Standards.
14. SMACNA – Rectangular Industrial Duct Construction Standards.
15. SMACNA – Round Industrial Duct Construction Standards.
16. SMACNA – HVAC Air Duct Leakage Test Manual.
17. UL 181 - Factory-Made Air Ducts and Connectors.
18. Engineering Design Manual for Air Handling Systems, United McGill Corporation (UMC).
19. Assembly and Installation of Spiral Ducts and Fittings, UMC.
20. Engineering Report No. 132 (Spacing of Duct Hangers), UMC.
21. AWSD1.1 American Welding Society Structural Welding Code.

1.04 INSTALLER QUALIFICATIONS:

A. Company shall have minimum three years documented experience specializing in performing the work of this section.

B. Installation of HVAC systems shall be performed by qualified Journeyman.

1.05 DEFINITIONS

A. Low Pressure

1. 2 inch W.G. Pressure Class: Ductwork systems up to 2 inch w.g. positive or negative static pressure with velocities less than or equal to 1500 fpm.

B. Medium Pressure

1. 3 inch W.G. Pressure Class: Ductwork systems over 2 inch w.g. and up to 3 inch w.g. positive or negative static pressure with velocities less than or equal to 2500 fpm.
2. 4 inch W.G. Pressure Class: Ductwork systems over 3 inch w.g. and up to 4 inch w.g. positive or negative static pressure with velocities less than or equal to 2500 fpm.
3. 6 inch W.G. Pressure Class: Ductwork systems over 4 inch w.g. and up to 6 inch w.g. positive or negative static pressure with velocities less than or equal to 2500 fpm.

C. High Pressure

1. 10 inch W.G. Pressure Class: Ductwork systems over 6 inch w.g. and up to 10 inch w.g. positive or negative static pressure with velocities greater than 2500 fpm.

1.06 SUBMITTALS

A. Product Data:

1. Provide the following information for each sheet metal system furnished on the Project:

a. System name and type.

b. Duct system design pressure.

c. Duct material.

d. Duct gage.

e. Transverse joint methods.

f. Longitudinal seam type.

g. Sealant type.

h. SMACNA rectangular reinforcement type.

i. SMACNA intermediate reinforcement type.

j. SMACNA transverse reinforcement type.

B. Record Documents:

1. Submit Shop Drawings on all items of ductwork, plenums, and casings including construction details and accessories specified herein in accordance with Division 01. Ductwork construction details and materials used for duct sealant, flexible connections, etc. shall be submitted and approved prior to the fabrication of any ductwork.

2. Draw ductwork Shop Drawings on minimum 1/4 inch equal to one foot scale building floor plans and shall indicate duct sizes, material, insulation type, locations of transverse joints, fittings, ductwork bottom elevation, offsets, ductwork specialties, fire and fire/smoke dampers, and other information required for coordination with other trades. Clearly designate the following on the Shop Drawings:

a. Clearance dimensions between ducts and or location dimensions from walls, floors, columns, beams and large bore piping.

b. Duct materials i.e., stainless steel, galvanized steel, prefabricated fire rated ductwork pressure class ratings of ducts as defined within this specification.

c. Duct materials i.e., stainless steel, galvanized steel, prefabricated fire rated ductwork.

d. Fire and fire/smoke partitions.

3. Detail Drawings for mechanical rooms and air handling unit locations shall be submitted at a minimum scale of 1/4 inch equal to one foot shall also be included within the Shop Drawings.

4. Coordinate with all other trades and building construction prior to submitting Shop Drawings for review. Indicate location of all supply, return, exhaust, and light fixtures from approved reflected ceiling plans on Shop Drawings.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver products to the Project Site and store and protect products under provisions of Division 01 and Division 20.

B. Protect materials from rust both before and after installation.

1.08 WARRANTY

A. All ductwork shown on the Drawings, specified or required for the air conditioning and ventilating systems shall be constructed and erected in a first class workmanlike manner.

B. The Work shall be guaranteed for a period of one (1) year from the Project Substantial Completion date against noise, chatter, whistling, vibration, and free from pulsation under all conditions of operation. After the system is in operation, should these defects occur, they shall be corrected as directed by the Owner at Contractor's expense.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. In general, the contract documents are diagrammatic and should not be scaled. It may be necessary to offset or to re-route the ductwork from the manner of installation shown. Such changes must be referred to the Architect for approval before proceeding. This contractor should expect minor deviations from the contract documents and include an allowance of 5000# of additional sheetmetal in his bid. This allowance shall include the fabrication and installation of ductwork revisions, weight to be based on actual size of ductwork. The contractors shall install his work in a manner so that interferences between the various trades are avoided. All deviations from sizes, locations, and from all other methods of the installation, shall be recorded.

C. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

D. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

2.02 APPLICATION

A. Ductwork systems shall be constructed in accordance with the following Materials as a minimum standard. Refer to Drawings for any deviation from this Table.

AIR SYSTEM	**MATERIAL**	**MINIMUM PRESSURE CLASSIFICATION** [(1)]
Supply and Return Systems:		
Untreated Outside Air Intake (Louver) to AHU Plenum	Galvanized Steel	Low Pressure
Treated Outside Air to AHU	Galvanized Steel	Medium Pressure
Single Zone AHU Supply	Galvanized Steel	Medium Pressure
Mixed Air (AHU Plenum)	Galvanized Steel	Medium Pressure
AHU Discharge/Vertical Supply Riser	Galvanized Steel	Medium Pressure
Vertical Supply Riser to Terminal Unit	Galvanized Steel	Medium Pressure
Terminal Unit Connection	Metal Flexible Duct	As Specified
Terminal Units to Supply Air Device	Galvanized Steel [(2)]	Low Pressure
Return Air Device to Return Distribution	Galvanized Steel [(2)]	Low Pressure
Return Air Distribution	Galvanized Steel	Low to Medium Pressure
Exhaust Systems:		
Exhaust Air Device to Exhaust Distribution (Restrooms duct system only)	Galvanized Steel [(2)]	Low Pressure
Exhaust Air Distribution (Restrooms duct system only)	Galvanized Steel	Low Pressure
General Exhaust Vertical Riser to Fan (Restroom duct system only)	Galvanized Steel	Low Pressure
General Exhaust exposed on the roof	316L Stainless Steel	Low Pressure

B. Notes to Table:

1. Positive pressure unless noted otherwise in Table.

2. Air device connections may be made with insulated flexible duct as specified herein.

2.03 DUCTWORK MATERIAL AND CONSTRUCTION

A. All ductwork indicated on the Drawings, specified or required for the air conditioning and ventilating systems shall be of materials as hereinafter specified unless indicated otherwise on Drawings. All air distribution ductwork shall be fabricated, erected, supported, etc., in accordance with all applicable standards of SMACNA where such standards do not conflict with NFPA 90A and where class of construction equals or exceeds that noted herein.

B. Ductwork shall be constructed of G-90 coated galvanized steel of ASTM A653 and A924 Standards.

C. Minimum gage of round, oval or rectangular ductwork shall be 26 gage per SMACNA Standards.

D. All duct sizes shown on the Drawings are clear inside dimensions. Allowance shall be made for internal lining, where specified, to provide the required free area.

E. All holes in ducts for damper rods and other necessary devices shall be either drilled or machine punched (not pin punched), and shall not be any larger than necessary. All duct openings shall be provided with sheet metal caps if the openings are to be left unconnected for future connections/phases, otherwise plastic covers are acceptable.

F. Except for specific duct applications specified herein, all sheet metal shall be constructed from prime galvanized steel sheets and/or coils up to 60 inches in width. Each sheet shall be stenciled with manufacturer's name and gage.

G. Sheet metal must conform to SMACNA sheet metal tolerances as outlined in SMACNA's "HVAC Duct Construction Standards."

H. Where ducts are exposed to view (including equipment rooms) and where ducts pass through walls, floors or ceilings; furnish and install sheet metal collars around the duct.

I. Spin-in fittings shall be as specified under Section 23 33 00 – Ductwork Accessories.

J. Duct Sealing: All ductwork, regardless of system pressure classification, shall be sealed in accordance with Seal Class A, as referenced in SMACNA Standards. All transverse joints, longitudinal seams, and duct wall penetrations shall be sealed.

1. All seams and joints in shop and field fabricated ductwork shall be sealed by applying one layer of sealant, then immediately spanning the joint with a single layer of 3 inches wide open weave fiberglass scrim tape. Sufficient additional sealant shall then be applied to completely embed the cloth.

2. Sealant shall be water based latex UL 181A-M sealant with flame spread of 0 and smoke developed of 0. Sealants shall be Hard Cast Iron Grip 601, Ductmate Pro Seal, Foster 32-19, Childers CP-146 or Design Polymerics DP 1010.

3. Scrim tape shall be fiberglass open weave tape, 3 inches wide, with maximum 20/10 thread count, similar to Hardcast FS-150.

4. Sealer shall be rated by the manufacturer and shall be suitable for use at the system pressure classification of applicable ductwork.

5. Except as noted, oil or solvent-based sealants are specifically prohibited.

6. For exterior applications, "Uni-Weather" (United McGill Corporation), solvent-based sealant, or Foster 32-19 shall be used.

2.04 RECTANGULAR AND ROUND DUCTWORK

A. Metal gages listed in SMACNA HVAC Duct Construction Standards, Metal and Flexible Duct, are the minimum gages which shall be used. Select metal gage heavy enough to withstand the physical abuse of the installation. In no case shall ductwork be less than 26 gage per SMACNA Standards.

B. All longitudinal seams for rectangular duct shall be selected for the specified material and pressure classification. Seams shall be as referenced in SMACNA Standards.

C. Longitudinal seams in laboratory hood exhaust ducts shall be welded.

D. All transverse joints and intermediate reinforcement on rectangular duct shall be as shown in SMACNA Standards. Transverse joints shall be selected consistent with the specified pressure classification, material, and other provisions for proper assembly of ductwork.

E. Spiral round duct and fittings shall be as manufactured by United McGill Sheet Metal Company, MKT Metal Manufacturing, TNT Manufacturing or approved equivalent. All fittings shall be factory fabricated, machine formed and welded from galvanized sheet metal.

F. Joints in spiral duct and fittings shall be assembled, suspended, sealed, and taped per manufacturer's published assembly and installation instructions.

G. Contractor may use DUCTMATE or Ward Industries coupling system, as an option, on rectangular ductwork. The DUCTMATE or Ward Industries system shall be installed in strict accordance with manufacturer's recommendations.

H. Rectangular ductwork field fabricated offsets shall not exceed 30 degrees.

2.05 FLAT OVAL DUCTWORK AND FITTINGS

A. Oval ducts shall be spiral flat oval or welded flat oval equivalent to those of United McGill Sheet Metal Company with gage and reinforcing as recommended by the manufacturer. Duct may be shop fabricated of completely welded construction in accordance with SMACNA Standards.

B. Oval ducts greater than 24 inch x 72 inch shall be longitudinal seam, flat oval duct, rolled, welded and provided in standard lengths of 5 and 10 feet. Transverse joints shall be factory welded or field connected with flanges or slip couplings. Duct shall be fabricated from galvanized steel meeting ASTM A 527 standards.

C. Duct reinforcing angles shall be of sizes specified for same size rectangular duct. Galvanized angles shall be used where standing seams are specified for rectangular duct.

D. Oval fittings shall comply with requirements, sealing, etc., similar to that specified for round ductwork. Manifolding taps may be permitted without increasing the length of run in the branch duct system.

E. Elbows in oval ducts may be smooth long radius or 5-piece 90-degree elbows and 3-piece 45-degree elbows. Joints in sectional elbows shall be sealed as specified for duct sealing.

2.06 CONICAL BELLMOUTH FITTINGS AND TAPS

A. Conical bellmouth fittings shall be made from 26-gage G-90 coated galvanized steell. Two-piece construction with a minimum overall length of 6 inches and factory sealed for high-pressure requirements. Average of loss coefficient for sizes 6, 8 and 10 shall be less than 0.055.

B. Provide each fitting with minimum 24-gage damper plate with locking quadrant operator and sealed end bearings. Damper blade shall be securely attached to shaft to prevent damper form rotating around shaft. Shaft shall be extended to clear insulation.

C. Provide a flange and gasket with adhesive peel-back paper for ease of application. The fittings shall be further secured by sheet metal screws spaced evenly at no more than 4 inches on center with a minimum of four (4) screws per fitting.

D. Conical bellmouth fittings shall be Series 3000G as manufactured by Flexmaster U.S.A., Inc. or Buckley Air Products, Inc., “AIR-TITE”.

2.07 CASINGS AND PLENUMS - 2 INCH W.G. PRESSURE CLASS

A. All 2 inch w.g. pressure class casings and plenums for mixed air plenums shall be constructed in accordance with SMACNA Standards.

B. All casings shall enclose the filter and automatic dampers as shown on the Drawings. Casings shall be fabricated of galvanized sheet metal erected with three-foot center maximum standing seams reinforced with ¼-inch bars. The casing shall be stiffened on three-foot centers maximum with angle irons tack welded in place.

C. All openings to the casing shall be properly sealed to prevent any air leakage. Access doors shall be installed as indicated on the Drawings and shall be air tight, double skin insulated construction with frames welded in place. Doors shall be rubber gasketed with #390 Ventlok gasketing and equipped with fasteners equal to Ventlok #310 latches and #370 hinges that can be operated from both the inside and the outside.

D. Casings shall be anchored by the use of angle irons sealed and bolted to the curb and floor of the apparatus casing. Casings shall be tested and provided tight at a pressure of three inches water column.

E. Insulate per Section 23 07 13.

2.08 CASINGS AND PLENUMS – 6 INCH W.G. PRESSURE CLASS

A. Shall enclose filters and automatic dampers at air handling unit systems. Casings shall be constructed of cellular, standing seam panels with 3 inch deep reinforced "hat" sections as manufactured by metal deck manufacturers and as described in SMACNA Standards.

B. All openings to the casing shall be properly sealed to prevent air leakage. Install access doors for easy access to equipment. Access doors shall be air tight, double skin insulated construction with frames welded in place. Doors shall be rubber gasketed with #390 Ventlok gasketing and equipped with fasteners equal to Ventlok #310 latches that can be operated from both the inside and outside. Hinges shall be equivalent to Ventlok #370.

C. Anchor casing by the use of galvanized angle irons sealed and bolted to the curb and floor of the apparatus casing as indicated in SMACNA Standards.

D. A fan discharge diffuser plate shall be located on the fan discharge and shall be constructed of 10 gage steel perforated plate installed in 6 inch channel iron frames (8.2#) rigidly supported to withstand the fan discharge velocity. Perforations shall be 3/8 inch (0.375 inch) staggered on 11/16 inch centers (27 percent open area). One section shall be hinged to provide an access door between the discharge side of the fan and the entering side of the coils. After fabrication of the diffuser plate, coat with rust-resistant paint. After installation, touch up diffuser plate and paint channel iron frames with rust-resistant paint.

E. Provide sufficient access openings to allow access for maintenance of all parts of the apparatus. Access door size shall be as large as feasible for the duty required.

F. Insulate per Section 23 07 13.

2.09 ELBOWS RECTANGULAR DUCTS

A. Construct elbows as follows in order of preference:

1. Long radius, unvaned elbows.

2. Short radius, single thickness vaned elbows.

3. Rectangular, double thickness vaned elbows.

B. Long radius elbows shall have a centerline radius of not less than one and one-half (1-1/2) times the duct width. Short radius elbows shall have a centerline radius of not less than one times the duct width.

C. Contractor shall have the option to substitute short radius vaned elbows, but shall request the substitution at the time of submittal of Product Data.

D. Provide turning vanes in all rectangular elbows and offsets.

E. Job fabricated turning vanes, if used, shall be fabricated of the same gage and type of material as the duct in which they are installed. Vanes must be fabricated for same angle as duct offset. Submit Shop Drawings on factory fabricated and job fabricated turning vanes.

F. All turning vanes shall be anchored to the cheeks of the elbow in such a way that the cheeks will not breathe at the surfaces where the vanes touch the cheeks. In most cases, this will necessitate the installation of an angle iron support on the outside of the cheek parallel to the line of the turning vanes.

G. In 90-degree turns that are over 12 inches wide in the plane of the turn, provide and install double thickness vanes on integral side rails. For ducts under 12 inches in width, use single thickness vanes. The installation of the turning vanes shall be as described for single thickness vanes. On other types of turns or elbows, single thickness trailing edge vanes shall be used.

2.10 FLEXIBLE DUCT

A. Flexible duct shall be used where flexible duct connections are shown on the Drawings to air distribution devices and terminal units and as scheduled under "Ductwork System Applications.

B. Acoustical Flexible Duct to Diffusers, Grilles, and Terminal Units:

1. Maximum flex duct length 5'-0" (five feet), installed with no more than 90 degrees of bend to diffusers and grilles. Where longer duct runs or more bends are necessary, provide rigid round ductwork.

2. Maximum flex duct length 2'-0" (two feet), installed as a straight run to the inlet of the terminal units.

3. Acoustical flexible duct shall be manufactured with an acoustically rated CPE inner film as the core fabric, mechanically locked by a corrosion-resistant galvanized steel helix.

4. Core shall be factory pre-insulated with a total thermal performance of R-3.5 or greater. Outer jacket shall be a fire retardant polyethylene vapor barrier jacket with a perm rating not greater than 0.10 per ASTM E 96, Procedure A.

5. Duct shall be rated for a minimum positive working pressure of 6 inches w.g. and a negative working pressure of 4 inches w.g. minimum.

6. Temperature range shall be –20 degrees F to 250 degrees F.

7. Duct must comply with the latest NFPA Bulletin 90A and be listed and labeled by Underwriter's Laboratories, Inc., as Class I Air Duct, Standard 181, and meet GSA, FHA and other U. S. Government standards; flame spread less than 25; smoke developed less than 50.

8. Acoustical flexible duct shall be similar to Flexmaster Type 8M for construction and acoustical performance standards.

C. Metal Flexible Duct:

1. May be used for terminal unit connections from sheet metal ductwork where shown on the Drawings.

2. Maximum length 2'-0" (two feet), installed in straight runs only. Where longer duct runs or direction changes are necessary, provide rigid round ductwork.

3. Duct shall be constructed of 0.005 inch thick 3003-H14 aluminum alloy in accordance with ASTM B209. Duct shall be spiral wound into a tube and spiral corrugated to provide strength and flexibility.

4. Core shall be factory pre-insulated with a total thermal performance of R-3.5 or greater. Outer jacket shall be fire retardant metalized vapor barrier jacket of fiberglass reinforced aluminum foil, with a permeance rating not greater then 0.05 per ASTM E96, Procedure A.

5. The duct shall be rated for a minimum positive and negative working pressure of 10 inch w.g.

6. Temperature range shall be –40 degrees F to 250 degrees F.

7. Duct must comply with the latest NFPA Bulletin 90A and be listed and labeled by Underwriter's Laboratories, Inc., as Class I Air Duct, Standard 181, and meet GSA, FHA and other U. S. Government standards; flame spread less than 25; smoke developed less than 50.

8. Metal flexible duct shall be similar to Flexmaster triple lock Type TL-M.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Cleanliness:

1. Before installing ductwork, wipe ductwork to a visibly clean condition.

2. During construction, provide temporary closures of metal or taped polyethylene on open ductwork and duct taps to prevent construction dust or contaminants from entering ductwork system. Seal ends of ductwork prior to installation to keep ductwork interior clean. Remove closures only for installation of the next duct section.

3. For ductwork supplying Clean Rooms, Operating Rooms and other Critical Care areas, sanitize ductwork with a biocidal agent EPA approved for HVAC systems immediately prior to sealing ductwork.

4. During duration of construction, maintain the integrity of all temporary closures until air systems are activated.

D. Provide openings in ductwork where required to accommodate thermometers, controllers and other devices. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring. Sleeve of pitot tube opening shall be no more than one inch long. Opening shall be one inch wide to accept pitot tube.

E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

F. Slope underground ducts to plenums or low pump out points at 1:500. Provide access doors for inspection.

G. Coat buried, metal ductwork without factory jacket with one coat and seams and joints with additional coat of asphalt base protective coating.

H. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

I. Provide residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for cleanout. Use stainless steel for ductwork exposed to view and stainless steel for ducts where concealed.

J. All visible welds in ductwork between biosafety cabinets, canopy hoods and fume hoods and the ceiling shall be ground and polished.

K. Slope duct toward grilles for moisture-laden ducts. Provide drain and trap at elbow of main moisture exhaust duct system.

L. Project inspector shall be notified to inspect all field fabricated offsets before cover-up or external insulation is applied.

M. Flexible Duct:

1. The terminal ends of the duct core shall be secured by compression coupling or stainless steel worm gear type clamp.

2. Fittings on terminal units and on sheet metal duct shall have flexible duct core slipped over duct and coupling or clamp tightened, then connection sealed with sealant. Insulation of flexible duct shall be slipped over connection to point where insulation abuts terminal unit or insulation on duct.

3. These insulation connections shall be sealed by embedding fiberglass tape in the sealant and coating with more sealant to provide a vapor barrier.

N. Support flexible ducts as per SMACNA standards to prevent sags, kinks and to have 90 degree turns.

O. Hangers and Supports:

1. All ductwork supports shall be in accordance with Table 4-1 (rectangular duct) and Table 4-2 (round duct) of the SMACNA Standards, with all supports directly anchored to the building structure.

2. Rectangular duct shall have at least one pair of supports on minimum 8’-0" (eight feet) centers. All horizontal round and flat oval ducts shall have ducts hangers spaced 10’-0" (ten feet) maximum.

3. Lower attachment of hanger to duct shall be in accordance with Table 4-4 of the SMACNA Standards.

4. Vertical ducts shall be supported where they pass through the floor lines with 1-1/2 inch x 1-1/2 inch x 1/4 inch angles for duct widths up to 60 inches. Above 60 inches in width, the angles must be increased in strength and sized on an individual basis considering space requirements.

5. Hanger straps on duct widths 60 inches and under shall lap under the duct a minimum of 1 inch and have minimum of one fastening screw on the bottom and two on the sides.

6. Hanger straps on duct widths over 60 inches shall be bolted to duct reinforcing with 3/8 inch bolts minimum.

3.02 DUCTWORK SYSTEM CLEANING

A. If the system has been operated without scheduled filters or if the integrity of temporary closures has been compromised, Contractor shall have ductwork cleaned according to National Air Duct Cleaners Association (NADCA) Standards by a Certified Regular Member of the NADCA.

   1. For ductwork supplying animal holding rooms, procedure rooms, and clean and sterile cage areas, also sanitize the ductwork interior per NADCA standards with a biocidal agent approved by the EPA for use in HVAC Systems.

B. Before turning the installation over to the Owner, Contractor shall certify that the air handling systems have only been operated with scheduled filters in place. Otherwise, Contractor shall present evidence that the ductwork was cleaned as required above.

3.03 TESTING

A. All medium and high pressure duct systems (positive or negative) shall be pressure tested according to SMACNA test procedures (HVAC Air Duct Leakage Test Manual). Notify Owner minimum seven (7) calendar days in advance of leakage testing.

   1. Design pressure for testing ductwork shall be determined from the maximum pressure generated by the fan at the nominal motor horsepower selected.

   2. Total allowable leakage shall not exceed 1 percent of the total system design airflow rate.

   3. When partial sections of the duct system are tested, the summation of the leakage for all sections shall not exceed the total allowable leakage.

4. Leaks identified during leakage testing shall be repaired by:

    a. Complete removal of the sealing materials.

    b. Thorough cleaning of the joint surfaces.

    c. Installation of multiple layers of sealing materials.

5. The entire ductwork system shall be tested, excluding connections upstream of the terminal units (i.e. ductwork shall be capped immediately prior to the terminal units, and tested as described above).

6. After testing has proven that ductwork is installed and performs as specified, the terminal units shall be connected to ductwork and connections sealed with extra care. Contractor shall inform the Owner when joints may be visually inspected for voids, splits, or improper sealing of the joints. If any leakage exists in the terminal unit connections/joints after the systems have been put into service, leaks shall be repaired as specified for other leaks.

7. Fixed flow measurement devices (i.e. orifice tubes, nozzles, etc.) shall have current calibration documentation showing that the device was verified to a National Institute Of Standards and Technology (NIST) standard within the previous five years or as recommended by the manufacture and be accurate to at least +/- 2% of reading.

8. Pressure measurement instrumentation (i.e. manometer) shall have current calibration documentation showing that the device was verified to a NIST standard within the previous year or as recommended by the manufacture. Instrumentation shall have an accuracy of at least +/- 2% of reading and have a resolution of 2:1 with respect to the measured pressure (i.e. resolution of 0.01 measured 0.1).

B. All low-pressure duct systems (positive or negative) shall be inspected for visible and audible signs of leakage.

    1. Leaks identified by inspection shall be repaired by:

        a. Complete removal of the sealing materials.

        b. Thorough cleaning of the joint surfaces.

        c. Installation of multiple layers of sealing materials.

    2. Discrepancies found during testing and balancing between duct traverses and diffuser/grille readings shall result in re-inspection, repair and retest until discrepancies are eliminated.

C. Contractor may be allowed to eliminate testing of terminal units by capping the supply ductwork prior to the terminal units, then inspecting the connection to the terminal units when complete. This option may only be exercised by the Owner, only if documented in writing prior to testing.

D. Ductwork leakage testing and/or inspection shall be performed prior to installation of external ductwork insulation.

END OF SECTION

SECTION 15820 – DUCTWORK ACCESSORIES

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install the following ductwork accessories indicated by the Contract Documents with supplementary items necessary for proper installation.

1. Airflow control dampers and spin-in fittings.

2. Flexible duct connections.

3. Duct access doors.

4. Screens

5. Duct test holes.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. AMCA 500D – Laboratory Method of Testing Dampers for Rating.

2. AMCA 500L – Laboratory Method of Testing Louvers for Rating.

3. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

4. NFPA 101 - Life Safety Code.

5. SMACNA - HVAC Duct Construction Standards.

6. UL 33 - Heat Responsive Links for Fire-Protection Service.

7. UL 555 – Standard for Fire Dampers.

8. UL 555C – Standard for Ceiling Dampers.

9. UL 555S – Standard for Smoke Dampers.

1.04 SUBMITTALS

A. Product Data:

1. Provide product data for shop fabricated assemblies including, but not limited to, volume control dampers, duct access doors, and duct test holes. Provide product data for hardware used.

B. Record Documents:

1. Fire Dampers: The damper manufacturer's literature submitted for approval prior to the installation shall include performance data developed from testing in accordance with AMCA 500D standards and shall show the pressure drops for all sizes of dampers required at anticipated air flow rates. Maximum pressure drop through fire damper shall not exceed 0.05-inch water gauge.

2. Combination Fire/Smoke Dampers: Assign identification numbers for each damper with corresponding number noted on Drawings. Provide air quantity, size, free area of damper, pressure drop and proposed velocity through each damper. Provide manufacturer's data of damper and its accessories or options. At Owner's request, provide two (2) dampers (18 inch x 12 inch) for the purpose of illustrating damper operation to Owner's operating and maintenance personnel.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Dampers:

1. Greenheck.

2. Ruskin

3. Nailor Industries.

4. Portorff

D. Regulators, Locking Quadrants:

1. Ventfabrics

2. Duro Dyne

3. Greenheck

2.03 AIR FLOW CONTROL DAMPERS

A. Furnish and install dampers where shown on the Drawings and wherever necessary for complete control of airflow, including all supply, return, outside air, and exhaust branches, "division" in main supply, return and exhaust ducts, and each individual air supply outlet. Where access to dampers through a permanent suspended ceiling (gypsum board) is necessary, the Contractor shall be responsible for the proper location of the access doors.

B. Dampers larger than three (3) square feet in area shall be controlled by a self-locking splitter damper assembly.

C. Volume damper blades shall not exceed 48 inches (48") in length or twelve inches (12") in width and shall be of the opposed interlocking type. The blades shall be of not less than No. 16 gage galvanized steel supported on one-half inch (1/2") diameter rust-proofed axles. Axle bearings shall be the self-lubricating ferrule type.

D. Volume dampers and other manual dampers shall be carefully fitted, and shall be manually controlled by damper regulators as follows:

1. On exposed uninsulated ductwork the locking quadrant shall be made with a base plate of 16-gage cold-rolled steel and a heavy die cast handle designed with a 3/8 inch bearing surface. A 1/4 inch-20 zinc plated wing nut shall firmly lock the handle in place.

2. On exposed externally insulated ductwork the regulator shall be 4-1/4 inch diameter, for 1/2 inch rod, designed for use on duct with insulation thickness specified for duct, and shall have four (4) 3/16 inch holes provided to rivet or screw regulator to the duct surface. The flange that covers the raw edge of the insulation shall be high enough so that it slightly compresses the insulation and holds insulation in place. The handle shall be 3/8 inch above the flange, and shall easily turn without roughing up the insulation.

3. On concealed ductwork above inaccessible ceilings, the regulator shall be 2-5/8 inch diameter chromium plated cover plate that telescopes into the base, for 1/2 inch rod. Regulator shall be cast into a box for mounting in ceilings. Base shall be 1-1/2 inch deep. The cover shall be secured by two screws that can be easily removed for damper adjustment.

4. Furnish and install end bearings for the damper rods on the end opposite the quadrant.

2.04 FLEXIBLE CONNECTIONS

A. Where ducts connect to fans or AHU's, flexible connections shall be made using "Ventglas" fabric that is temperature-resistant, fire-resistant, waterproof, mildew-resistant and practically airtight, weighing approximately thirty ounces (30 oz.) per square yard. Ventglas is good for connections for inside building environments where ultra-violet light is not present.

B. Material used outdoors shall be resistant to ultra-violet sunrays. There shall be a minimum of one-half inch (1/2-inch) slack in the connections, and a minimum of two and one-half inches (2-1/2-inch) distance between the edges of the. This does not apply to air handling units with internal isolation. A more rugged flexible material that is resistant to ultra violet rays needs to be used when connecting an exhaust fan or exhaust air plenum to ductwork. Mercer Rubber supplies a more durable flex connection for outdoor use.

C. Connections to Chemical Fume Hoods

1. Flexible connections shall be made using a coupling with stainless steel bands as manufactured by Flexmaster, Inc.

2.05 ACCESS DOORS

A. Furnish and install in the ductwork, hinged rectangular, pressure relief, or round "spin-in" access doors to provide access to all fire dampers, mixed air plenums, steam reheat coils (install upstream), automatic dampers, etc.

B. Where ductwork is insulated, access doors shall be double skin doors with one inch (1") of insulation in the door. Doors shall be rated for the designed system pressure in which they are installed. Cam latches are acceptable, provided the number required properly seals the door.

C. Where duct size permits, doors shall be eighteen inches (18") by sixteen inches (16"), or eighteen inches in diameter, and may be provided with Ventlok No. 260 latches (latches are not required in round doors).

D. Latches for rectangular doors smaller than 18 inch x 16 inch may be Ventlok No. 100 or 140.

E. Doors for zone heating coils shall be Ventlok, stamped, insulated access doors, minimum 10 inch x 12 inch, complete with latch and two (2) hinges, or twelve inches (12") in diameter.

F. Round access doors shall be "Inspector Series" spin-in type door as manufactured by Flexmaster USA.

G. Doors for personnel access to ductwork shall be nominal twenty-four inches (24") in diameter. Doors may be fabricated in a local approved sheet metal shop in accordance with SMACNA Standards.

H. Where access doors are installed above a suspended ceiling, this Contractor shall be responsible for the proper location of ceiling access doors.

2.06 SCREENS

A. Furnish and install screens on all duct, fan, etc., openings furnished by this Contractor which lead to, or are located outdoors.

B. Screens shall be No. 16 gage, one-half inch (1/2") mesh in removable galvanized steel frame.

C. Provide safety screens meeting OSHA requirements for protection of maintenance personnel on all fan inlets and fan outlets to which no ductwork is connected.

2.07 ROUND BRANCH TAKEOFF W/ DAMPER TO DIFFUSERS

A. Furnish and install Flexmaster #STOD-BO3, Spiral Pipe of Texas or approved equal degree boot tap type side take off fittings with dampers for all round ducts connecting to the side of rectangular ducts. Construction shall be 26 gauge, G-90 galvanized steel. Mounting flanges must be pre-punched, 1” wide, and provided with corner clips and adhesive gaskets. Dampers shall have full length 3/8” square shafts connected with U-Bolts, nylon bearings, 2” insulation build outs and Duro Dyne #KR-3, Elgin Quadrant or approved equal heavy duty locking hand quadrants. Spin collar with wing nut dampers not allowed.

2.08 CABLE CONTROL SYSTEM AND BALANCING DAMPERS

A. Furnish and install, at all inaccessible locations (re: above hard gypsum ceilings), refer to architectural ceiling finishing schedule, commercial grade control dampers and remote cable control system that meet the following minimum standards

B. Remote Cable Control System: Damper controller and cable shall be concealed above the ceiling. Cable to consist of Bowden cable .054” stainless steel control wire with a tensile strength of 260,000 lbs. that is encapsulated in 1/16” flexible galvanized spiral wire sheath. Control kit shall consist of “C” bracket to fastened above the ceiling , 7/8” diameter cold rolled steel zinc plated threaded cap suitable for painting, and 14 gauge steel rack and pinion gear drive capable of delivering 35 in. lbs. of push / pull torque that converts rotary motion to push-pull motion. Control shaft shall be D-style flatted 1/4” diameter with 265-degree rotation providing graduations for positive locking and control, and 1-1/2” linear travel capability. Control kit is designed to be imbedded in the ceiling flush with the finished surface. Control kit shall be manually operated using Young Regulator Model 030 wrench. Control kit shall be Young Regulator Model 270-896-AS or equal by United Enertech.

C. Rectangular Cable Controlled Dampers: Damper(s) to be opposed blade type constructed of .050 minimum heavy duty extruded aluminum frames and blades. All necessary hardware to ensure compatibility with Bowden remote cable control system shall be included. Damper blades to include individual blade bushings for smooth and quiet operation. Damper blades shall rotate between a matched pair of formed and punched 306 stainless steel connecting slide rails that facilitate smooth blade movement and ensure alignment. Damper(s) shall be Young Regulator Model 830A-CC-AS or equal by United Enertech.

D. Round Cable Controlled Dampers: Damper(s) to be constructed of heavy duty galvanized steel spiral shell design with rolled-in stiffening beads for superior rigidity. Spiral shell shall have one crimped end and one straight end for ease of installation. Damper to include "V" style 20 gauge galvanized steel blade secured with ½" diameter steel shafts and oil impregnated bronze bearings requiring no lubrication. Damper shall include all necessary hardware to ensure compatibility with Bowden remote cable control system. Damper(s) shall be Young Regulator Model 5020-CC-AS or equal by United Enertech.

2.09 MISCELLANEOUS SHEETMETAL AND DUCT ACCESSORY HARDWARE

A. Auxiliary Drain Pans (Air Handling Units and Hot Water Heaters): Fabricate of 18-gauge stainless steel iron turned up four (4) inches all around and extend six (6) inches beyond all sides of equipment (air handling units, hot water heaters, etc.). Size of auxiliary drain pans to be based on equipment size maintaining minimum 6" clearance all around. All auxiliary drain pans to be 316 stainless steel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing.

D. Install all dampers furnished by the BAS Provider in strict accordance with manufacturer's written installation instruction and requirements of these Specifications.

E. Provide backdraft dampers on exhaust fans or exhausts ducts where indicated. Install dampers so that they will open freely.

F. Flex connectors are not required at equipment with internally isolated fans. Cover connections to medium and high pressure fans with leaded vinyl sheet, held in place with metal straps where noted on the Owner's drawings.

G. Provide duct access doors for inspection and cleaning before and after duct mounted filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated on Drawings. Provide minimum 8 x 8 inch (200 x 200 mm) size for hand access, 18 x 18 inch (450 x 450 mm) size for shoulder access, and as indicated.

H. Provide duct test holes where indicated and where required for testing and balancing purposes.

1. Furnish and install Ventlok No. 699 instrument test holes in the return air duct and in the discharge duct of each fan unit.

2. Install test holes in locations as required to measure pressure drops across each item in the system, e.g., outside air louvers, filters, fans, coils, intermediate points in duct runs, etc.

3.02 TESTING

A. After each fire damper, smoke damper and combination fire and smoke damper has been installed and sealed in their prescribed openings and prior to installation of ceilings, Contractor shall, as directed by Owner, activate part or all dampers as required to verify “first-time” closure.

B. Activation of damper shall be accomplished by manually operating the resettable link, disconnecting the linkage at the fire damper fusible link, and manually operating the fire/smoke damper through the pneumatic or electronic controls as appropriate.

C. Failure of damper to close properly and smoothly on the first attempt will be cause to replace the entire damper assembly.

D. Coordinate smoke damper system interlock requirements with the fire alarm system.

END OF SECTION

SECTION 15900 – TEMPERATURE CONTROLS

PART 1 - GENERAL REQUIREMENTS

1.1. SCOPE OF WORK

A. Provide and install new Direct Digital Controls to allow the Owner to schedule, monitor and control the HVAC equipment included in the scope of work for this project. Refer to the project plans, schedules, and keynotes for additional information and instructions.
B. The control system shall include all wiring, conduit, sensors, switches, relays, valves, actuators, electrical interlocks, and other control end devices necessary to accomplish monitoring, scheduling, and automatic control, per the sequences of operation and project specific point lists.

1.2. QUALITY ASSURANCE

A. Manufacturer shall be a company specializing in products of the type specified in this section.
B. The contractor shall be the local office of a nationally recognized organization. This office shall be staffed with factory trained engineers and technicians fully capable of providing instruction, routine maintenance, and 24 hour emergency service on all system components.

1.3. RELATED WORK IN OTHER SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions and General Requirements are a part of these Specifications and shall be used in conjunction with this Section as a part of the Contract Documents. Consult them for further instructions pertaining to this work. This Contractor is bound by the provisions of Division 0 and Division 1.
B. Mechanical contractor shall install all control valves, sensor wells, pressure taps and piping connections for flow devices that are specified to be supplied by the Controls contractor.
C. Sheet metal contractor shall install all dampers and airflow devices that are specified to be supplied by the Controls contractor.
D. Electrical contractor shall furnish power wiring and conduit to all new control system panels. Coordinate location of all new control panels with the Electrical contractor. Fire Alarm System components, including duct mounted smoke detectors, are furnished and installed by the Electrical contractor.

1.4. SUBMITTALS

A. Submit (6) copies of submittal data for review by the Engineer. No work may begin on any portion of this project until the Engineer has reviewed submittals for conformity with the plans and specifications.
B. Submittal data shall include a complete bill of materials to be used indicating quantity, manufacturer and model number.
C. A schedule of control dampers including damper size, pressure drop, manufacturer and model number.
D. Provide the Engineer and Owner any additional information or data which is deemed necessary to determine compliance with these specifications or which is deemed valuable in documenting the system to be installed.
E. Submit as-built drawings and Operation and Maintenance manuals for the control system at project closeout. This shall include as-built versions of the submittal data and manufacturer's installation instructions and wiring diagrams relative to this project.

1.5. WARRANTY

A. Labor and materials for control system specified shall be warranted free from defects for a period of (12) months after final completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired or replaced at no charge or reduction in service to the Owner. The contractor shall respond to the Owner's request for warranty service within 24 hours during normal business hours.

PART 2 – PRODUCTS

2.1. APPROVED MANUFACTURERS

A. Johnson Controls
B. Louisiana Controls
C. Prior Approved Equal

2.2. GENERAL

A. Control system shall include but not be limited to the following components.
    1. Direct digital unit controllers and programmable controllers capable of interfacing with the existing JCI Metasys system.
    2. End devices such as sensors, relays, dampers, valves and actuators.
    3. The failure of any single component shall not interrupt the control strategies of other operational devices. System expansion shall be through the addition of end devices, controllers and other components described in this specification.

2.3. MATERIALS

A. All products used in this installation shall be new, currently under manufacture and shall be applied in similar installations at other facilities.

2.4. CONTROL SYSTEM INTERFACE

A. The operator interface shall be accessible via standard web browsers.
B. Operator interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract.
C. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point and-click navigation between zones or equipment, and to edit set points and other specified parameters.
D. Access to the operator interface shall not require any "plug-ins" (i.e. JAVA Runtime Environment (JRE), Adobe Flash) in addition to the web browsers identified below.
E. The operator interface shall support the following Internet web browsers:
   1. Internet Explorer 10.0+
   3. Chrome 35.0+
F. The operator interface shall support the following mobile web browsers:
   1. iOS (iPad/iPhone) V6.0+
   2. Android (Tablet) V4.3+
   3. Android (Phone) V2.3+
G. The operator interface shall support system access on a mobile device via a mobile app to view:
   1. Alarm log
   2. System Status
   3. Equipment status
   4. Space Status
   5. Standard Equipment graphics
H. The operator interface shall support actions on a mobile device via a mobile app to:
   1. Override set points
   2. Override occupancy
   3. Acknowledge Alarms
   4. Comment on Alarms
I. Each operator shall be required to login to the system with a user name and password in order to view, edit, add, or delete data.. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable

.

2.5. SYSTEM CONTROLLER

A. There shall be one or more independent, standalone microprocessor based System Controllers to manage the global strategies described in Application and Control Software section.
B. The System Controller shall have sufficient memory to support its operating system, database, and programming requirements.
C. All System Controllers shall have a real time clock and be capable of time of day scheduling.
D. The System Controller shall maintain all BIOS and programming information indefinitely without power to the controller.
E. Communications between System Controllers and sub-networks of Unit Controllers shall utilize BACnet/MSTP (RS485) or BACnet/Zigbee Pro (wireless) only.
F. BACnet Test Labs (BTL) Listing. Each System Controller shall be listed as a Building Controller (B-BC) by the BACnet Test Labs with a minimum BACnet Protocol Revision of 14.

2.6. UNIT CONTROL MODULES (UCM)

A. Each piece of equipment shall be provided with a dedicated DDC controller. No sharing of controllers between multiple pieces of equipment will be allowed.
B. Unit Control Modules shall be capable of standalone operation in the event that communication with the System Controller is interrupted.
C. The hardware and enclosure shall be suitable for the anticipated ambient conditions.
D. Hardwired inputs and outputs may tie into the system via Unit Control Modules (UCM). Slave or expansion devices are also acceptable. Any critical points requiring immediate reaction shall be tied directly into the controller hosting the control software algorithm for the critical function.
E. Binary inputs shall allow the monitoring of on/off signals from remote devices. The binary inputs shall provide a wetting current of 12mA at 12VDC to be compatible with commonly available control devices. All status points shown on the point list shall be positive proof differential pressure or current sensing binary switches.
F. Analog inputs shall allow the monitoring of low voltage, current, or resistance signals and shall have a minimum resolution of 0.1% of the sensing range. Analog inputs shall be compatible with, and field configurable to commonly available sensing devices.
G. Binary outputs shall provide a continuous low voltage signal for on/off control of remote devices.
H. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0 to 10 VDC or a 4 to 20 ma signal as required to provide proper control of the output device.

2.7. AUXILIARY CONTROL DEVICES

A. Temperature Sensors

1. Temperature sensors shall be Thermistors with minimum 1% accuracy.
2. Duct sensors shall be rigid probe or averaging sensors of the appropriate size. Averaging sensors shall be a minimum of 6 feet in length and sized according to the square footage of the area being sensed.
3. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.
4. Space or zone temperature sensors shall be equipped with an LCD display and timed override and cancel buttons.
5. Setpoint functional range on zone sensors shall be 45 to 90 degrees F.
6. Provide matched temperature sensors for differential temperature measurement. Differential accuracy shall be within 0.1 C [0.2 F].B. Humidity Sensors

1. Duct and room sensors shall have a sensing range of 20% to 80% with accuracy of ±3% R.H.
2. Duct sensors shall be provided with a sampling chamber.
3. Outdoor air humidity sensors shall have a sensing range of 20% to 95% R.H. It shall be suitable for ambient conditions of -40 C to 75 C [-40 F to 170 F].
4. Humidity sensor's drift shall not exceed 1% of full scale per year. C. Static Pressure Sensors

1. Sensor shall have linear output signal. Zero and span shall be field- adjustable.
2. Sensor sensing elements shall withstand continuous operating conditions plus or minus 50% greater than calibrated span without damage.

D. Carbon Dioxide (CO2) Sensors

1. Carbon Dioxide sensors shall measure CO2 in PPM in a range of 0-2000 ppm. Accuracy shall be +/- 3% of reading with stability within 5% over 5 years. Sensors shall be duct or space mounted as indicated in the sequences of operation.

E. Relays

1. Control relays shall be UL listed plug in type with dust cover or fully enclosed. Contact rating, configuration, and coil voltage shall be suitable for application.
2. Time delay relays shall be UL listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable plus or minus 200% (minimum) from set-point shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide IP 20 Type enclosure when not installed in local control panel.

F. Electronic Valve/Damper Actuators

1. All actuators shall be electronic, low voltage (24 VAC) and sized so as to stroke the damper or valve smoothly and efficiently throughout it's entire range.
2. Actuators shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator.
3. All rotary spring return actuators shall be capable of both clockwise or counter clockwise spring return operation. Linear actuators shall spring return to the retracted position.
4. All non-spring return actuators shall have an external manual gear release to allow manual positioning when the actuator is not powered. Spring return actuators with more than 60 in-lb of torque shall have a manual crank for this purpose.
5. Proportional actuators shall accept either a 0-10 VDC or 0-20 mA control signal.
6. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the maximum rated torque.

G. Transformers and Power Supplies
1. Control transformers shall be UL listed, Class 2 current-limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service. Maximum 100va at 24 volts per power supply circuit, for conformance with Class 2 rating.
2. Unit output shall match the required output current and voltage requirements. Current output shall allow for a 50% safety factor. Output ripple shall be 70.0 mV maximum Peak-to-Peak. Regulation shall be 5% line and load combined, with 50 microsecond response time for 50% load changes. Unit shall have built-in over-voltage protection.
3. Unit shall be UL recognized.H. Current Switches
1. Current-operated switches shall be self-powered, solid state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system.

PART 3 – EXECUTION

3.1. INSTALLATION

A. All electrical work performed in the installation of the control system as described in this specification shall be per the National Electrical Code (NEC) and per applicable state and local codes. Where exposed, conduit shall be run parallel to building lines properly supported and sized at a maximum of 40% fill. In no cases shall field installed conduit smaller than ½" trade size be allowed.

B. Install sensors in accordance with the manufacturer's recommendations.

C. Mount sensors rigidly and adequate for the environment within which the sensor operates.
D. Wiring for space sensors shall be concealed in building walls.
E. Install outdoor air temperature sensors on north wall complete with sunshield at designated location.

3.2. WIRING

A. Refer to Division 16 or 26 - Electrical specifications for installation of all wiring.
B. All wiring shall conform to the Local and National Electrical Codes.
C. All low voltage wiring shall meet NEC Class 2 requirements.
D. Line voltage control wiring shall be run in electrical conduit.
E. Concealed, accessible low voltage wiring may be plenum rated provided that it is properly supported from the building structure at a maximum of 5 foot centers. Ceiling grid and sprinkler pipe are not to be used as supports.
F. No splices will be allowed except at junction boxes and in control panels.
G. Control voltage shall be a maximum of 120-volt, unless otherwise indicated herein.
H. Control or interlock wiring shall not be run in conduit with any power wiring other than that serving the equipment controlled.
I. Control circuit conductors shall be sized for a maximum voltage drop of 10 percent of the circuit voltage.
J. All electrical power wiring shall conform in all respects with the provisions of the National Electrical Code and the Electrical section of the project specifications.

3.3. SYSTEM COMMISSIONING

A. Check-out each system for control function through entire sequence, check calibration of instruments, reset instruments and control points.
B. Provide documentation of all tests and verifications, when requested.
C. Owner maintenance personnel shall be made thoroughly familiar, by the contractor, with the operation and service of the project automatic temperature control circuits.

3.4. TRAINING/DEMONSTRATION

A. Provide a minimum of (8) hours of project specific training, for personnel designated by the Owner, after the commissioning and acceptance period.
B. Review control system drawings and identify location of all controllers and panels with the Owner.

C. Train the designated Owner representatives to proficiently program, troubleshoot, and operate the system.

D. The instructor shall be a factory trained instructor or factory trained technician, qualified to provide training on the type of system utilized on this project.

PART 4 - SEQUENCES OF OPERATION AND POINT LISTS

4.00 GENERAL

A. This summary is provided to establish a minimum guide for BAS configuration. The BAS subcontractor shall be required to provide and install any additional points required to meet the BAS system and Sequences of Operation specified herein. The contractorshall provide all supplemental control devices and sequences recommended by the manufacturer for all equipment controlled by the BMS.

B. The sequences of operation and points list shall be provided according to the following unless noted otherwise. Refer to drawings for counts of items listed.

C. Common Sequences

All HVAC systems shall be equipped with the following control and sequencing:

1. Alarms shall be provided for all set points with an adjustable alarm set point differential (both high and low), alarm delay, alarm disable switch, and alarm priority. Alarms shall be provided for all enable/disable commands with status sensors to alarm when those conditions do not match.

2. Optimal Start/Stop Control: All equipment shall include an optimal start stop sequence. Equipment necessary for the operation of other equipment shall be interlocked such that a single priority enables all necessary equipment for that system.

3. Demand Limiting: All air side equipment shall include an adjustable priority assignment to stage equipment. Each air terminal and AHU shall be capable of being proportionally throttled to achieve the demand control set point.

4. Scheduling: All equipment shall be capable of group and individual scheduling.
   Equipment necessary for the operation of other equipment shall be interlocked such that a single scheduling command enables/disables all necessary equipment for that system.

D. The listed sequences of operation are for comfort control only and do not list required safety controls. All required safety controls, including but not limited

to, smoke detectors, firestats, smoke dampers and fire alarm interlock shall be installed in accordance to NFPA 96 and applicable codes.

1. AHU fans shall be disabled by the fire alarm smoke detectors via hard wired interlock. Control contractor shall provide wiring from fire alarm relay. Coordinate relay location with fire alarm vendor.

E. Refer to the equipment specifications including, but not limited to, condensing units, air handling units, and fire alarm for required integration to factory mounted panels.

F. Weekly Scheduling Feature:

1. All Digital Outputs (DO's) shall have the ability to be controlled on a 7- day time schedule, holiday schedule and temporary time schedules.

2. Occupied/Unoccupied Mode:

The system shall be in "OCCUPIED" mode during the hours of operation (adjustable). During the hours of non-operation; whenever any Air Handling Unit is commanded ON, the "FACILITY STATUS" point will be commanded to "OCCUPIED" (ON) mode. Whenever all of the Air Handling Units are commanded OFF, the "FACILITY STATUS" point will be commanded to UNOCCUPIED" (OFF) mode.

4.01 DX SPLIT SYSTEM HVAC UNITS

A. These AHU's are equipped with a DX cooling coil, a condensing coil, an electric heater, supply fan and a motorized outside air damper.

B. The AHU shall be enabled when: The Master AHU Control virtual point is "ON"

C. If the Master AHU control virtual point is "ON":
The AHU supply fan shall be enabled by the BAS to run based off of a time schedule in the BAS server. The AHU supply fan shall show run status thru a CT relay in the fan starter and shall issue an alarm condition to the BAS in the event of a fan failure. The outside air damper shall be indexed open anytime the AHU supply fan runs based off of the fan run status (motorized damper position based on CO2 sensor in return air ductwork). The smoke detector and freeze stat shall stop the AHU supply fan thru a hardwired connection in the fan starter in case of an alarm condition.

D. Space Temperature Control:
The AHU DX cooling coil and electric heater shall be staged by the BAS to maintain space temperature from a pre-determined setpoint (adj.).The space temperature shall be transmitted to the BAS by the space temperature sensor. If the space temperature exceeds the space temperature alarm setpoint (adj.), an alarm shall be sent to the BAS. If the space temperature rises above the space temperature setpoint (adj.), the first stage of DX shall be indexed to run. Upon a return to space temperature setpoint, the first stage of DX shall be

indexed to stop. If the space temperature drops below the space temperature setpoint, the electric heater shall be indexed to run. Upon a rise back above the space temperature setpoint, the electric heater shall be indexed to stop. Upon a fan failure alarm at the BAS, the DX cooling shall be indexed to stop and the electric heater shall be indexed to stop.

E. Humidity Monitoring:
The AHU shall have a humidity sensor in the space & Return air that transmits the return air humidity to the BAS. Upon a rise in humidity above the return air humidity setpoint (70% adj.), the cooling shall be energized (electric heater to be energized to maintain space temperature setpoint).

F. A temperature sensor in the discharge air of the AHU shall transmit the discharge air temperature back to the BAS for monitoring purposes only. A temperature sensor in the return air of the AHU shall transmit the return air temperature back to the BAS for monitoring purposes only. A temperature sensor in the mixed air of the AHU shall transmit the mixed air temperature back to the BAS for monitoring purposes only.

G. Safeties:

a. All of the safety devices shall be manual reset; the device that has tripped must be manually reset before restarting the air handling unit.

b. If a temperature high limit switch senses a temperature above setpoint the supply fan will be shutdown.

c. If a temperature low limit switch senses a temperature below setpoint the supply fan will be shutdown.

d. If a fire alarm shutdown contact is triggered, the supply fan will be shutdown.

e. If there is a detection of smoke, the supply fan will be shutdown.

f. Water is detected in the auxiliary drain pan under the air handling unit.

g. When the unit is shut down by either a stop command or system safety the unit will be set as follows:

a. Supply fan will be off

b. Supply fan VFD will be commanded to 0%

c. Outside air damper will close

d. Condensing Unit will be off.

4.02 VAV TERMINAL UNITS

A. Variable air volume terminal units shall be controlled by DDC VAV terminal unit controllers.

B. A (wall mounted) room temperature sensor with integral display (thermostat), located where indicated, shall transmit temperature changes to the terminal unit DDC controller. Unless indicated otherwise, space temperature setpoint shall be adjustable from the wall module (thermostat), but local setpoint shall have programmable high/low temperature control limit (initially set 76 F/68 F, except for public corridor/lobby spaces which shall be limited to 75°F/72°F). When pressed, an override button integral to the wall module (thermostat) shall place the system in operation for a programmable (three hours initially) time period.

C. On a drop in room temperature below setpoint, the terminal unit shall be modulated from a maximum cooling air flow to minimum cooling air flow. On a further drop, beyond the heating-cooling dead band (2°. F, initially), the terminal unit shall increase the airflow to the re-heat airflow setpoint and engage the electric heat strips to maintain space conditions. On a rise in room temperature, the reverse shall occur.

4.03 FMS POINT LIST:

VAV AIR HANDLING UNIT:

BO	START/STOP
BI	STATUS
BI	COOLING STAGE 1
BI	COOLING STAGE 2
AO	VFD SPEED
AO	RETURN AIR DAMPER
AO	OUTSIDE AIR DAMPER
AI	STATIC PRESSURE
AI	MIXED AIR TEMP
AI	RETURN AIR TEMP
AI	RETURN AIR HUMIDITY

VAV BOXES:

AI	SUPPLY AIR TEMP
AO	DAMPER
AI	ZONE TEMP
AI	ZONE SETPOINT
AI	DISCHARGE AIR TEMP
BO	OCCUPANCY SENSOR
BO	ELECTRIC HEAT

END OF
SECTION

SECTION 15933 – AIR TERMINAL UNITS

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install the following products as indicated by the Contract Documents/Plans with supplementary items necessary for proper installation.

Single duct variable or constant volume terminal units.

Integral heating coils.

Integral controls.

Integral sound attenuator where scheduled

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

UL 181 - Factory-Made Air Ducts and Connectors.

ARI Standard 880 for Air Terminals.

ANSI/ASHRAE Standard 130 – Methods of Testing for Rating Ducted Air Terminal Units.

1.04 SUBMITTALS

A. Product Data:

1. Shop Drawings of product data indicating configuration, general assembly, access space required for service, and materials used in fabrication.

2. Electronic or Printed Catalog performance ratings that indicate nominal inlet size, CFM, applicable static pressure at the inlet or discharge of terminal unit, and noise criteria with sound octave band and sound decibel test in accordance with ARI 880, for the insulation lining selected.

3. Leakage curves indicating inlet static pressure and actual tested leakage rates shall be submitted for all non-standard or custom-built terminal units.

4. Unit manufacturer shall test and certify that each terminal unit used on this Project has been tested as specified.

B. Record Documents:

1. Submit under provision of Division 01.

C. Operation and Maintenance Data:

1. Operating instructions and maintenance manuals indicating maintenance and repair data, parts lists.

1.05 SHIPMENT TESTING PRIOR TO INSTALLATION

A. Shipment Testing: At the Owner's discretion, a minimum of ten (10) percent of each size single duct terminal unit (but no less than one unit of each size on the Project) will be tested at the Project Site for casing leakage and damper leakage. Contractor shall allow sufficient time during construction for the TAB Firm to perform all testing as may be required.

B. Unit Non-Performance:

1. If results of the shipment testing show that any of the units do not perform as specified, then an additional ten (10) percent of each size unit (but no less than one unit of a size, unless 100 percent of the size has been tested) shall be tested.

2. If this testing, in the Owner's opinion, shows that ten (10) percent or more of the units tested do not perform as specified, then 100 percent of all unit sizes shall be tested for conformance with these Specifications.

3. The results of that testing shall be reviewed carefully between the Contractor, manufacturer, Owner, and Engineer. A method of repair or replacement of units will be negotiated. The Owner, however, shall maintain the right of final approval of any proposed solution.

C. Should for any reason, the testing as described in this Section prove that any of the units do not perform as specified, Contractor shall be responsible for all subsequent labor, travel, travel expenses and incidental expenses, penalties, or other costs attendant to any additional testing as described in this Section, or as required to prove that the units perform as specified. This shall include, but not be limited to, the labor, travel and reasonable incidental expenses of not only the Contractor and TAB Firm, but also those incurred by the Owner as may be specifically required for this purpose.

1.06 WARRANTY

A. Provide one year manufacturer's warranty from date of substantial completion..

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three (3) years documented experience.

D. The same manufacturer shall provide all products supplied and/or installed under this Section.

E. Manufacturers:

Refer to schedule on drawings.

2.03 GENERAL CONSTRUCTION

A. This section applies to single duct, dual duct, and fan powered terminal unit configurations as described within this Specification.

B. Casing Construction:

1. Units shall be constructed of 22 gage galvanized steel.

2. All interior features of the boxes (such as mixing baffles, damper housings, etc.) shall be secured within the casing to avoid excessive movement or rattling with air movement or externally generated vibration.

3. All external features of the terminal units shall be designed not to extend beyond the ends of the unit. For example, the actuator mounting brackets, etc. shall not extend beyond the plane of the inlet "bulkhead." The only exception shall be flow sensors installed in the inlet duct connections. Note that if a separate flow station is installed within a frame within the casing, then it shall be so installed not to allow airflow to bypass the flow measurement station.

C. Ductwork Connections:

1. Construct units with inlet and discharge ductwork connections. The inlet ductwork connections shall extend a minimum of 4 inches from the unit casing including an allowance for the installation of airflow station(s) or probe(s).

2. The discharge connection shall include S & drive connections for use by the Contractor to secure the discharge ductwork or appurtenances to the unit and shall be reinforced to provide a rigid assembly.

3. External insulation shall be as specified in the Contract Documents for duct insulation with full vapor barrier.

D. Single Duct Casing Leakage: Assembled units shall be constructed such that casing leakage does not exceed 1.0 percent of terminal unit rated airflow at 4 inches w.g. of inlet static pressure.

E. Casing Liners:

1. Liners Applications (Doublewall): Terminal unit casing shall be double wall lined with 1-inch thick, 1.5 lb density fiberglass insulation enclosed between the unit casing and a non-perforated, internal sheet metal cover. The interior wall cover shall be 22 gage galvanized steel. The interior wall cover shall extend over the fiberglass insulation and cover the liner cut edges. The exterior cover shall be 20 gage galvanized steel.

   a. Insulation shall meet requirements of UL181 and NFPA 90A.

   b. Casing shall be insulated throughout its interior.

F. Damper:

1. Damper blades shall be heavy gage galvanized steel and shall be securely riveted or bolted through the damper shafts to assure no slippage of the blades. The damper shafts shall operate in rustproof self-lubricating bearings. Damper shafts penetrating the unit casings shall be sealed against leakage and bearings shall be installed for protection against wear in the casing penetration. Damper shafts shall be formed of, or cut from solid stock; no hollow shafts will be allowed. The dampers shall seat against gasketed stops or the dampers shall have gasketed edges. The dampers shall be constructed with the proper rigidity to prevent deformation of the damper blade. The damper actuator linkage, if used, shall be constructed of material of sufficient strength to avoid buckling under extreme loads. Also, linkages shall not allow play greater than 5 degrees of damper movement. The controls for the dampers shall cause the dampers to fail in the position of last control (freeze in place), or fail to the open position.

2. Damper Leakage: In the full closed position, air leakage past the closed damper shall not exceed 2% of the nominal catalog rating at 3"w.g. inlet static pressure, when tested in accordance with ASHRAE 130.

3. Flow Measurement: Airflow through the unit shall be accomplished by the use of a multi-port velocity pressure cross sensor or multi-axis flow ring devices with a minimum of four (4) radial distribution pick-up points connected to a center averaging chamber. The chamber is to be designed with adequate internal passages to prevent restrictions that can possibly contribute to control 'hunting'. Calibration of each terminal unit with the building automation system (BAS) Provider's controller is to be performed by the manufacturer prior to shipping the terminal unit to the Project Site.

G. Access Plenum:

1. Single duct units with electric coils shall be provided with an access section or plenum between the single duct terminal and the coil for coil inspection. Plenum construction shall be equal to the quality of materials and workmanship of the terminal unit.

2. Access section shall contain a minimum of a 12 inch diameter or 12 inch x 12 inch (or full unit width if less than 12 inches) access door.

3. Door frame may be bolted, screwed, or flanged and sealed to the casing. Door shall be gasketed and shall be constructed similar to main casing. Door shall be held in place with latches or other captive retainer devices.

H. Electric Heating Coils:

1. Where electric heating coils are specified, and where boxes are not located in return plenums shall have the electric coil sections wrapped with duct wrap in the field to ensure no sweating occurs at the heating section

2. Electric heating coils shall be provided of the capacity scheduled on the drawings. The heating coils shall be factory mounted. Terminal assembly shall be UL 1995 certified. Overall length of assembly from inlet panel to discharge shall be 35 inches maximum. The heater frame and cabinet shall be constructed of heavy gauge galvanized steel. Heating elements shall be constructed of High Grade wire. Elements shall be low density and designed to minimize hot spots and nuisance cycling of the thermal protectors. Elements shall be insulated from the steel frame by floating ceramic bushings. Contactors shall be disconnecting type designed so that all power to the heat strip is off with the contactor de-energized. This does not allow two pole contactors on a three phase delta heat strip. An automatic reset thermal cut-out shall be provided as primary protection against overheating. Heaters shall be equipped with a manual reset cut-out for secondary protection. Fused secondary thermal devices are not acceptable. A differential pressure switch shall be provided to ensure that there is adequate airflow before heater is energized. A main power fused disconnect shall be provided as an integral component of the unit. This disconnect is the single point connection for the entire terminal unit including the heater and the DDC controls. Heater controls to be accessible from the same side as the primary air controls.

H. Unit Controls:

1. General Performance: Flow stations, control transformers, disconnect switch, and controls enclosure shall be furnished, mounted and adjusted by the terminal unit manufacturer to assure their proper placement within the units. If DDC controls of another manufacturer (not the terminal unit manufacturer) are provided for the Project, the terminal unit manufacturer shall be responsible only for construction of the terminal unit and installation of internal control components installed at the manufacturer's factory and shall not be responsible for installation of controls not installed at the terminal unit manufacturer's factory, nor shall the manufacturer be responsible for the performance of the DDC controls. The performance of DDC controls in connection with terminal units shall be the responsibility of the BAS Provider.

2. Control Performance: Assemblies shall be able to be reset to any airflow between zero and the maximum CFM shown on Drawings. To allow for maximum future flexibility, it shall be necessary to make only simple screwdriver or keyboard adjustments to arrange each unit for any maximum airflow within the ranges for each inlet size as scheduled on the Drawings. The control devices shall be designed to maintain the desired flow regardless of inlet flow deflection.

3. Control Sequences: The control sequence arrangements shall be as described on the Drawings. Terminal units shall be shipped from the manufacturer with all necessary control devices to accomplish each sequence, except as may be prohibited by the BAS Provider. The desired sequence shall be adjustable according to space usage or a change in space conditions.

I. DDC Controls Protocol/Description:

1. BAS Provider will be responsible for providing all damper actuators, linkages, flow transducers, controllers, room temperature sensors, and any other devices required for unit control, except as specified below.

2. BAS Provider will be responsible for calibrating the actuator and its controller through TAB work for scheduled airflow rates. Units shall be capable of field calibration and readjustment with external gauge taps.

3. Unit manufacturer shall provide unit inlet flow sensor and pneumatic tubing for BAS Provider's use.

4. Unit manufacturer shall factory install all devices furnished by BAS Provider to result in a complete functioning unit. Unit manufacturer shall be responsible for reviewing compatibility of devices furnished by BAS Provider to units provided.

J. Pressure and Leakage Certification:

1. Manufacturer shall certify that each unit used on the Project will perform as specified. Each unit shall bear a tag or decal listing the following specified information:

a. Min and max cfm's

b. VAV tag

c. Flow calibration chart

2.04 SINGLE DUCT VARIABLE OR CONSTANT VOLUME TERMINAL UNIT

A. Pressure independent, single duct variable or constant air volume control assemblies, of the sizes, capacities and configurations as scheduled on the Drawings.

B. Unit pressure drop across the assembly with an equivalent 2000 fpm inlet velocity through the inlet shall not exceed 0.15 inches water gauge.

C. Sound Ratings: All sound power levels shall be obtained from testing in accordance with ARI Standard 880.

D. Wiring:

1. Factory mounts and wires controls. Mount electrical components in control box with removable cover. Incorporate single point electrical connection to power source.

2. Provide a 50 VA, 120 volt control power 24 VAC transformer and terminal strip in control box for field wiring of controls and power source. Factory mounts the transformer on electronically controlled terminal units. Contractor shall inform terminal manufacturer of the primary voltage in order to provide the correct step down control transformer.

3. Provide factory installed toggle disconnect switch with circuit fusing for controller protection.

4. Provide factory supplied hanging brackets

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Provide clearance for inspection, repair, replacement, and service. Ensure accessibility to all terminal unit electrical control panel doors, controllers and operators are located a minimum of 30 inches from all obstructions (walls, pipe, etc.).

D. Provide ceiling access doors or locate units above easily removable ceiling components.

E. Install terminal units with a minimum of four (4) diameters of straight duct directly prior to the entry into each terminal unit connection.

F. Support units individually from structure. Do not support from adjacent ductwork. For terminal units that are not internally isolated, refer to Section 20 05 48 for terminal unit vibration isolation requirements. Terminal units shall be supported using units hanger brackets and threaded rods.

G. Connect to ductwork in accordance with Section 15815.

H. Wiring and controller compartments, electronic motors and damper motors shall have a minimum 24 inch clear wide and deep working space readily accessible from lift out ceiling tiles or access panels.

END OF SECTION

SECTION 15936 – AIR OUTLETS AND INLETS

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Perform all Work required to provide and install diffusers, diffuser boots, registers/grilles, louvers, louver penthouses, roof hoods, and goosenecks indicated by the Contract Documents with supplementary items necessary for proper installation.

1.03 REFERENCE STANDARDS

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. AMCA 500 - Test Method for Louvers, Dampers and Shutters.

2. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

3. ARI 890 – Rating of Air Diffusers and Air Diffuser Assemblies.

4. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

5. SMACNA 1035 - HVAC Duct Construction Standards - Metal and Flexible.

1.04 QUALITY ASSURANCE

A. Test and rate performance of air outlets and inlets in accordance with ASHRAE 70.

B. Test and rate performance of louvers in accordance with AMCA 500.

1.05 SUBMITTALS

A. Product Data:

1. Submit product data and Shop Drawings, indicating type, size, location, application, noise level, finish, and type of mounting.

2. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data.

B. Operation and Maintenance Data:

1. Submit manufacturer's installation instructions under provisions of Division 01.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Grilles, registers and diffusers shall be as scheduled on the Drawings Grilles, registers and diffusers shall be provided with sponge rubber or soft felt gaskets where noted on the Drawings Grilles, slot diffusers and laminar flow bars shall not be internally insulated. If a manufacturer other than the one scheduled is used, the sizes shown on the Drawings shall be checked for performance, noise level, face velocity, throw, pressure drop, etc., before the submittal is made. Selections shall meet the manufacturer's own published data for the above performance criteria. The throw shall be such that the velocity at the end of the throw in the five (5) foot occupancy zone will not exceed 50 fpm nor be less than 25 fpm except where indicated otherwise. Noise levels shall not exceed those published in ASHRAE for the type of space being served (NC level). In the vicinity of lab hoods, terminal velocity at face of hood shall not exceed 20 fpm.

C. Locations of air distribution devices on Drawings are approximate and shall be coordinated with other trades to make symmetrical patterns and shall be influenced by the established general pattern of the lighting fixtures or architectural reflected ceiling plan, but primarily located to maintain proper air distribution. Where called for on Drawings, grilles, registers and diffusers shall be provided with deflecting devices and manual dampers. These grilles, registers, and diffusers shall be the standard product of the manufacturer, and subject to review by the Architect.

D. Provide a frame compatible with the type of ceiling or wall in which the devices are installed. Refer to Architectural Drawings for exact type of ceiling specified.

E. Coordinate color and finish of the devices with the Architect.

2.02 MANUFACTURERS

A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character and quality of the product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to Pre-Bid Approval requirements of Instructions to Bidders.

B. Where no manufacturer or model number is given, any product meeting performance or design criteria, or referenced trade association standard may be used and Pre-Bid Approval is not required.

C. Grilles, Registers, and Diffusers:

1. Price Industries.

2. Titus Products.

3. Nailor Industries.

4. Krueger Manufacturing Company.

5. MetalAire

2.03 RECTANGULAR CEILING DIFFUSERS

A. Rectangular, full louvered face, directional, removable multi-core type diffuser to discharge air in 360-degree pattern. Neck size shall be as scheduled on the Drawings. Provide filler panels, where required, for directional throw diffusers.

B. Fabricate frame and blades of extruded aluminum with factory baked enamel, off-white finish.

C. Provide multi-louvered equalizing grid .where noted on Drawings

D. Provide round neck connection as scheduled on schedule a drawings.

2.04 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Streamlined blades, depth of which exceeds 3/4-inch spacing, with spring or other device to set blades, vertical face.

B. Fabricate 1-inch margin frame with concealed mounting.

C. Fabricate of aluminum with minimum 20 gage frames and minimum 22 gage blades, aluminum with minimum 20 gage frame, aluminum extrusions, with factory baked enamel finish.

D. Opposed blade damper with removable key operator, operable from face shall only be provided with the grille when it is scheduled on the schedule and drawing.

2.05 CEILING EGG CRATE EXHAUST AND RETURN REGISTERS/GRILLES

A. Fixed series of cubes comprised of 1/2 x 1/2 x 1-inch aluminum strips.

B. Fabricate one-inch margin aluminum frame.

C. Fabricate of aluminum with factory baked enamel finish.

D. Provide square uniform height plenum for ducted return and exhaust application of scheduled neck size.

E. Provide eggcrate grilles where noted on schedule and drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation shall be in accordance with manufacturer's published recommendations.

C. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, reflected ceiling plans, symmetry, and lighting arrangement.

D. Install air outlets and inlets to ductwork with airtight connection.

E. Provide balancing dampers on duct take-off to diffusers, grilles and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly. The use of extractors or scoops at duct take-off to diffusers, grilles and registers is not allowed.

F. Paint ductwork visible behind air outlets and inlets matte black.

G. Provide all specialties and frames for air distribution devices as required for proper installation in ceiling type as indicated on Architectural Drawings. Provide all cutting and patching of T-bars, gypsum board, and other ceiling systems as required for installation of air devices.

END OF SECTION

SECTION 15954 – TESTING AND BALANCING

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.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. The **Contractor** shall obtain the services of an independent Test and Balance (TAB) Company which specializes in the testing and balancing of heating, ventilating and air conditioning (HVAC) systems to test, adjust and balance all HVAC systems in the building(s).

B. The work included in this section consists of furnishing labor, instruments, and tools required in testing, adjusting and balancing the HVAC systems, as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results. The testing, adjusting and balancing agency shall act as a reporting agency; that is, list and report each piece of equipment as to identification number, manufacturer, model number, serial number, proper location, specified performance, and report actual performance of all equipment as found during testing. The report is intended to be used during the life of the building as a ready reference indicating original conditions, equipment components, etc.

C. Representatives of the Test and Balance Company shall visit the job site at 60% and 90% completion of installation of the HVAC equipment, piping and ductwork to review the installation. After each site visit, the Test and Balance Company shall report to the Architect any items that are not installed properly, are missing from the installation or items that are required to enable him to perform the testing and balancing of the HVAC systems as per normal standard practice. After review, the Architect shall instruct the Contractor to implement the recommendations at no additional cost to the Owner if these items were specified in the original scope of the project.

D. Upon completion of the HVAC system installation, the Test and Balance Company shall perform all required testing and balancing with the full cooperation of the Contractor and his Sub-contractors. The Contractor shall make changes and/or adjustments to the HVAC system components that are required by the Test and Balance Company to accomplish proper balancing. The TAB agency shall not supply or install any materials or balancing devices such as pulleys, drives, belts, etc. All of this work is by the Contractor and shall be performed at no additional cost to the Owner.

E. The test and balance report shall be submitted to the Architect for review by his Mechanical Engineer. If the Mechanical Engineer agrees with the report, he shall sign it and return it to the Architect. If he does not concur with the report, he shall meet with the Test and Balance Company to determine what needs to be done to obtain a properly balanced system.

F. After the Mechanical Engineer signs the testing and balancing report, the Test and Balance Company shall supply four (4) copies of the final and complete report to the Architect for inclusion in the Operation and Maintenance Manuals. The items requiring testing, adjusting, and balancing include (but are not restricted to) the following:

AIR SYSTEMS:
Supply Fan AHU (Existing)
Exhaust Fans (Existing)
Zone branch and main ducts
Diffusers, Registers, Grilles and Dampers
Coils (Air Temperatures)
Valves
VAV Systems

HYDRONIC SYSTEMS:
System Mains and Branches
Coils

1.03 REFERENCE STANDARDS

A. All work shall be in accordance with the latest edition of the Associated Air Balance Council (AABC) National Standards or the latest standards of the National Environmental Balancing Bureau (NEBB). If these contract documents set forth more stringent requirements than the AABC National Standards or the NEBB Standards, these contract documents shall prevail.

1.04 QUALITY ASSURANCE

A. Agency Qualifications: The TAB Agency shall be a current member of the AABC or the NEBB..

1.05 SUBMITTALS

A. Qualifications: The TAB agency shall submit a company resume listing personnel and project experience in air and hydronic system balancing and a copy of the agency's test and balance engineer (TBE) certificate.

B. Procedures and Agenda: The TAB agency shall submit the TAB procedures and agenda proposed to be used.

C. Sample Forms: The TAB agency shall submit sample forms, which shall include the minimum data required by the AABC National Standards or the NEBB Standards.

1.06 TAB PREPARATION AND COORDINATION

A. Shop drawings, submittal data, up-to-date revisions, change orders, fan curves, pump curves and other data required for planning, preparation, and execution of the TAB work shall be provided when available and no later than 30 days prior to the start of TAB work

B. System installation and equipment startup shall be complete prior to the TAB agency's being notified to begin, except that duct leak testing shall be done during construction.

C. The building control system (BCS) contractor shall provide and install the control system, including all temperature, pressure and humidity sensors. These shall be calibrated for accurate control. If applicable, the BCS contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided as required for reprogramming, coordination, and problem resolution.

D. All test points, balancing devices, identification tags, etc., shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.

E. Qualified installation or startup personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.

F. If, upon commencing the work, the TAB contractor finds that the systems are not ready, or if a dispute occurs as to the readiness of the systems, the TAB contractor may request an inspection to be made by the Designer’s Mechanical Engineer. This inspection shall establish to the satisfaction of the represented parties whether or not the systems meet the basic requirements for testing and balancing. Items that are determined to be not ready for testing and balancing shall be completed by the Mechanical Contractor and placed in operational readiness before TAB services are again requested.

G. Shop drawings, submittal data, up to date revisions, change orders, fan curves, pump curves and other data required for planning, preparation, and execution of the TAB work shall be provided to the TAB firm no later than 30 days after final approved submittals and data have been returned by the Architect to the Contractor.

H. The Owner reserves the right to hire a second TAB firm to review the TAB report of the first, the Owner also has the right to hire a second TAB firm to check the work of the first TAB firm.

1.07 REPORTS

A. Final TAB Report - The TAB agency shall submit the final TAB report for review by the Architect. On plans provided, all outlets, devices, HVAC equipment, etc., shall be identified (including manufacturer, model number, serial number, motor manufacturer, HP, drive type, fan and motor sheaves and belt number), along with a numbering system corresponding to report unit identification. The TAB agency shall submit an AABC "National Project Performance Guaranty" (or similar NEBB Guaranty) assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and AABC National Standards (or similar NEBB Standards).

B. Submit 4 copies of the Final TAB Report to the Architect for inclusion in the Operation and Maintenance Manuals..

PART 2 - PRODUCTS

2.01 INSTRUMENTATION

A. All instruments used for measurements shall be accurate and calibrated. Calibration and maintenance of all instruments shall be in accordance with the requirements of AABC National Standards (or similar NEBB Standards)..

PART 3 - EXECUTION

3.01 GENERAL

A. The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC National Standards (or similar NEBB Standards). Adjustment tolerances shall be + or - 10% unless otherwise stated.

B. Equipment settings, including manual damper quadrant positions, valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.

C. All information necessary to complete a proper TAB project and report shall be per AABC or NEBB standards unless otherwise noted. The descriptions of work required, as listed in this section, are a guide to the minimum information needed.

D. TAB contractor shall cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. Upon completion, patch insulation, ductwork and housings using materials identical to those removed. Seal insulation to reestablish integrity of the vapor barrier.

E. TAB work shall include additional inspection and adjustment of components during the season following the initial balance to include re-balance of any items influenced by seasonal changes or as directed by the Owner.

3.02 AIR SYSTEMS

A. The TAB agency shall verify that all ductwork, splitters, extractors, dampers, grilles, registers, and diffusers have been installed per design, are functional and set full open. Any leakage in the ductwork shall be repaired prior to the test. The TAB agency shall perform the following TAB procedures in accordance with the AABC National Standards or NEBB Standards:

B. Supply Fans

1. Fan speeds - Test and adjust fan RPM to achieve design CFM requirements.

2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.

3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.

4. Outside Air - Test and adjust the outside air on applicable equipment using a Pitot-tube traverse. If a traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet. If a traverse is not practical use the mixed-air temperature method if the inside and outside temperature difference is at least 20 degrees Fahrenheit or use the difference between Pitot-tube traverses of the supply and return air ducts.

5. Static Pressure - Test and record system static pressure, including the static pressure profile of each supply fan.

C. Exhaust Fans

1. Fan speeds - Test and adjust fan RPM to achieve design CFM requirements.

2. Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.

3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.

4. Static Pressure - Test and record system static pressure, including the static pressure profile of each return fan.

D. Zone, Branch and Main Ducts:

1. Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

E. Diffusers, Registers and Grilles:

1. Tolerances - Test, adjust, and balance each diffuser, grille, and register to within 10% of design requirements. Minimize drafts. Include required CFM, initial test CFM and final CFM.

2. Identification - Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.

F. Coils:

1. Air Temperature - Once air flows are set to acceptable limits, take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

G. VAV Systems:

1. Identify the type, location, and size of each terminal box. This information shall be recorded on terminal box data sheets.

2. Test, adjust and record the maximum and minimum box air quantities for each VAV box.

3. Set volume regulators on all terminal boxes to meet design maximum and minimum CFM requirements.

4. Test and record entering and leaving air temperature of hot water coils with full heating air flow and water flow.

5. Insure the entering static pressure is sufficient for normal, proper box operation.

3.03 ADDITIONAL TAB SERVICES

A. Job Site Inspections: During construction, the TAB agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems. Inspections shall be conducted a minimum of two times. (Typically, these are performed when 60% of the total system is installed and again when 90% of the total system is installed, prior to insulation of the duct and piping). The TAB agency shall submit a written report of each inspection to the Architect.

B. TAB Report Verification: At the time of final inspection, the TAB agency may be required to recheck, in the presence of the owner's representative, specific and random selections of data, air quantities, and air motion recorded in the certified report. Points and areas for recheck shall be selected by the owner's representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, will not exceed 10% of the total number tabulated in the report.

END OF SECTION

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide labor, materials, equipment, and services, and perform all operations required for the complete electrical system as specified herein or shown on the accompanying drawings.

1.02 RELATED DOCUMENTS:

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections apply to the work of all sections of this Division 16.

1.03 DRAWINGS AND SPECIFICATIONS:

A. Conform to arrangement indicated by contract documents, recognizing that portions of work are shown only in diagrammatic form.

B. Materials, work, or equipment not mentioned, but normally necessary for the proper execution of this work, shall be provided as if specifically called for.

C. The drawings show approximate locations of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are shown. The Architect reserves the right to make reasonable changes in locations, before roughing-in, without additional cost to the Owner.

D. Because of the small scale of the drawings, it is not possible to show all of the offsets, fittings, and accessories required. Investigate structural and finish conditions and arrange work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.

E. Where coordination requirements conflict with individual system requirements, comply with the Architect's decision on resolution of conflict.

1.04 REGULATORY COMPLIANCE

A. Applicable sections of National Fire Protection Association (NFPA) standards (latest edition) including the National Electrical Code and applicable codes or ordinances shall apply as minimum standards.

1.05 MATERIALS AND EQUIPMENT

A. Materials and equipment shall conform to the requirements set forth in these specifications and the accompanying drawings. See Division 1 sections for provisions regarding substitutions.

B. Except as otherwise specified, materials and equipment shall be new and bear the approval label of the Underwriters' Laboratories, Incorporated.

1.06 SUBMITTALS:

A. Refer to Division 1 for Submittal Requirements.

B. Submittals Required: Refer to Division 16 Sections for submittals required. Provide complete submittals where required. Required submittals include but are not limited to the following:

Lighting Fixtures - Manufacturer’s Product Data

Wiring Devices – Manufacturer’s Product Data

Panelboards – Manufacturer’s Product Data, Scaled Electrical Room Drawing

Transformers – Manufacturer’s Product Data, Scaled Electrical Room Drawing

MC Cable – Manufacturer’s Product Data

Communications System - Manufacturer’s Product Data, Shop Drawings

Fire Alarm - Manufacturer’s Product Data, Shop Drawings

C. Corrections or comments made on submittals during review shall not relieve the Contractor from compliance with requirements of the contract documents. Submittals will be checked for general conformance with the design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings or other submittals shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop Drawings or other submittals shall not permit any deviation from Drawings and Specifications.

1.07 PROTECTION OF APPARATUS:

A. Take precautions necessary to protect electrical equipment from damage. Failure to comply shall be sufficient cause for the rejection of the equipment.

1.08 PHASED CONSTRUCTION; SCHEDULING:

A. Refer to Division 1 for determination of how construction phasing and sequencing may affect performance of electrical work.

B. Perform work in accordance with sequences shown on drawings and/or as necessary to maintain continuity of electrical service to adjacent areas within the building.

C. Provide temporary power and data as required to accommodate all phasing requirements. Coordinate on site with engineer.

1.09 ALTERNATES

A. There may be certain alternates involved in the construction. Be aware of and provide appropriate adjustments for all alternates described in the specifications or on the drawings.

1.10 EQUIPMENT MANUALS

A. Provide digital documents for review prior to final inspection. Full sized drawings may be included. Prepare digital document covers with printed title "ELECTRICAL OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of documents.

B. Internally subdivide the document contents, logically organized as described below. Prepare a Table of Contents for each volume. Provide a directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.

C. Provide operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers.

D. Include project documents and certificates, including the following:

1. Shop drawings and product data for all equipment.
2. Documentation of fire alarm system.
2. Test Data.
3. Certificates.
4. Photocopies of warranties and bonds.

1.11 RECORD DRAWINGS:

A. Except where otherwise indicated, electrical drawings (contract drawings) are diagrammatic in nature and may not show locations accurately for various components of electrical systems. Submittals prepared by Contractor show certain portions of work more accurately to scale and location, and in greater detail. It is recognized that actual layout of installed work may vary from both contract drawings and submittals.

B. Maintain white-print set (blue-line or black-line) of electrical contract drawings and shop drawings in clean, undamaged condition for mark-up of actual installations which vary substantially from work as shown. Mark-up whatever drawings are most capable of showing installed conditions accurately; however, where shop drawings are marked, record reference note on appropriate contract drawing. Mark with erasable pencil, and use multiple colors to aid in distinguishing between separate electrical systems. In general, record every substantive installation of electrical work which previously is either not shown or shown inaccurately, but in any case record the following:

1. Work concealed behind or within other work, in a non-accessible arrangement.
2. Mains and branches of wiring systems, with switchboards, panelboards, and control equipment and devices located and numbered.
3. Scope of each change order, denoting C.O. number.
4. Grounding systems.
5. Sensor and signal locations of alarm and control systems.
6. Updated panelboard schedules in Excel format.

C. Transmit mark-up drawings as submittal to Architect for Owner's use and record.

1.12 WARRANTY/GUARANTEE:

A. Guarantee all labor and materials for a period of twelve (12) months from the date of final notice of final acceptance of the work or as required by Division 1, whichever is longer. Repair all defective materials and work; replace with new materials and/or equipment, any material and/or equipment failing to give satisfactory service.

B. During the period of guarantee, promptly correct any defects in equipment, materials or workmanship without cost to the Owner.

1.13 TESTS AND BALANCING:

A. Conduct operating tests to demonstrate that electrical systems are installed and will operate properly and in accordance with the requirements of this Specification. Tests shall be performed in the presence of the Architect's representative. Furnish instruments and personnel required for such tests.

B. Replace any work or materials tested and found varying from the requirements of the Drawings and Specifications without additional cost to the Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION

A. Examine condition of substrate to receive work, and conditions under which work will be performed, and make notification of conditions detrimental to completion of work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

B. It is recognized that Contractor has inspected existing facilities, is familiar with the area of the site and underground utilities thereon, and that proper coordination of electrical work with existing work is a basic project requirement.

C. Layout electrical work in conformity with contract drawings, coordination drawings and other shop drawings, product data and similar requirements, so that entire mechanical/electrical plant will perform as an integrated system, properly interfaced with other work.

3.02 COORDINATION OF ELECTRICAL INSTALLATION

A. Sequence, coordinate, and integrate various elements of electrical work so that electrical system will perform as indicated. Architect/Engineer will not supervise coordination, which is exclusive responsibility of Contractor.

B. Arrange work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on wiring devices and similar units in front of services requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work. Locate operating and control equipment and devices for easy access.

C. Install access panels where electrical work requiring access is concealed by finishes and similar work.

D. Integrate electrical work in ceiling plenums, including lighting fixtures, with ceiling finish, suspension, ductwork, air diffusers and other work, so that required performances of each will be achieved.

E. Give right-of-way in confined-service spaces to piping which must slope for drainage and to larger HVAC ductwork and similar services which are less conformable than electrical services.

3.03 UTILITY CONNECTIONS

A. Electrical service will be obtained from owner facilities.

B. Coordinate electrical work with the existing electrical equipment. Comply with requirements of owner regarding all new electrical service requirements.

C. Electric service shall be installed, connected, and available for full use prior to completion or acceptance of the work.

3.054 CUTTING AND PATCHING

A. Do not cut structural framing, walls, floors, decks and other members intended to withstand stress except with Architect's written authorization. Authorization will be granted only where there is no other reasonable method for completing electrical work, and where proposed cutting clearly does not materially weaken the structure.

B. All penetrations made in walls, floors, or other building partitions for raceways, cables, equipment, etc., including penetrations in concealed areas (above ceilings, in chases, etc.) shall be either bore drilled or core drilled as required by the installation. Bust/poke through penetrations with hand tools are not acceptable. All penetration work shall be neat and debris shall be removed and the area cleaned after completion. Penetrations through walls or ceilings in visible finished areas shall be patched and painted as required to restore the finish around the penetration to its original condition.

C. Do not endanger or damage other work through procedures and processes of cutting to accommodate electrical work. Review proposed cutting with Installers of the work to be cut, and comply with their recommendations to minimize damage. Where necessary, engage original Installer or other specialists to execute cutting in recommended manner.

D. Where patching is required to restore other work, because of cutting or other damage occurring during installation of electrical work, execute patching in manner recommended by original Installer.

3.06 WIRING METHODS - GENERAL

A. All wiring shall be run in conduit or other type raceways unless specifically noted or allowed otherwise by the Owner.

B. Wiring run without raceways shall be bundled together with reusable Velcro wraps (not nylon tie wraps) at least once between each 4'-0" support. Wiring shall be routed on the supports as high as possible, free and clear of mechanical equipment, lighting fixtures, piping, conduits, ductwork, building structural members and any other building equipment or items. Utilize new J-Hooks to route data cabling. J-Hooks shall be installed no more than 6'-0" on center.

C. Cables shall not rest on the ceiling support grid system or other building items. Do not support from ceiling system supports, HVAC ductwork, conduit, piping, etc. Any cables found to be installed improperly will be noted and the contractor will be required to properly support the cables at no cost to the owner. Prior to the start of construction, the contractor shall make note of existing cables to remain that are improperly installed and inform the owner of such conditions. Coordinate correctional work with owner.

D. Each wiring system (fire alarm, telecom, etc.) shall be run separate with separate hangers.

E. Where wiring run without raceways penetrates walls or ceilings, a metal conduit sleeve with bushings at each end shall be provided for the penetration. Cables shall not be run through holes in walls or ceilings. Utilize STI EZ Path 44 Series sleeves in any smoke or fire rated walls.

F. Each cable shall be continuous, without splices or connections from the source to the connected device. Routing shall be parallel or perpendicular to building walls. Support arrangement and tension on cables shall be minimized to prevent exceeding the maximum cable bending radius. Where cables transition from sections run without a raceway into sections run with a raceway, a bushing shall be installed on the entrance to the raceway (conduit, Wiremold, etc.).

3.07. FIREPROOFING:

A. Where conduit and/or cables penetrate fire-resistant/rated walls, partitions, ceilings, or floors, adequate fire seals using approved methods to maintain the fire-resistance rating shall be provided and installed. Fire caulk shall be installed

by a certified fire caulk installer. All fireproofing shall comply with specification Division 07 – Firestopping.

B. Penetrations shall be sealed using the design and materials of an Underwriters Laboratory (UL) listed method to maintain the fire resistance rating of the system. Provide documentation that the product is acceptable within the UL assembly being penetrated. This information shall be made available at the time of Fire Marshal inspection. All existing walls and ceilings shall be considered to have a minimum 2-hour assembly rating.

C. Plastic sleeves/pipe shall not be used within the building when penetrating a fire-resistant-rated wall, ceiling, partition, or floor.

3.08 MOUNTING HEIGHTS

A. Unless otherwise noted on the drawings or required by the Architect, the following mounting heights shall apply. Heights are to center of device unless noted otherwise:

Toggle Switches	4’-0”
Receptacles	1'-6"
Panelboards	6'-6" to top
Communication Outlets	1'-6"
Motor Control Equipment	5'-0"
Fire Alarm Horns	7'-0" to bottom of lens
Fire Alarm Stations	4'-0"

C. Coordinate wiring device mounting height with wall protection. If wall protection mounting heights interfere with wiring device mounting heights, wall protection takes precedence. Coordinate with Engineer on site.

3.09 ELECTRICAL PRODUCT COORDINATION

A. Power Characteristics: Refer to sections of Division 2 through 15 to confirm and verify project's power requirements, including voltages, ratings and characteristics, and ensure power availability for operation of each power consuming item of equipment. Coordinate purchases to ensure uniform interface with each installed item requiring electrical power.

B. Coordination of Options and Substitutions: Where contract documents permit selection from several product options, do not proceed with purchasing until coordination of interface requirements has been checked and satisfactorily established.

C. Wiring for Equipment by Others: Electrical service required for all equipment furnished under Division 15 (Mechanical), 16 (Electrical), or other Divisions of this Specification shall be furnished and connected as part of this work. It is part of the work of this Division to obtain correct roughing-in dimensions and requirements for this equipment. Review electrical requirements of equipment actually furnished as shown in material submittals provided for review and as

shown on equipment nameplates prior to rough in of electrical work. Notify Architect of discrepancies prior to rough-in of electrical work.

3.10 MECHANICAL WORK

A. Coordinate electrical work with mechanical work (Division 15) for proper service to each item of equipment requiring electrical connection. Determine, with each mechanical equipment installer, the proper sequencing and location for disconnect switches and similar points of interface between mechanical and electrical work.

B. Except as otherwise indicated, final power connections are electrical work.

C. Motor controllers will be furnished as part of the mechanical work. This contractor for the electrical work shall install and connect all motor controllers not furnished as an integral part of another item of equipment.

D. Unless otherwise indicated, control and interlocking wiring for automatic temperature and ventilation controls is not part of this Division-16 work.

3.11 EQUIPMENT ROOM COORDINATION

A. Concurrent with electrical submittals for panelboards, transformers and automatic transfer switches, provide scaled drawings showing the proposed arrangement of equipment in electrical rooms using the actual dimensions of equipment submitted. Submittal will not be reviewed without this information.

3.12 CLOSEOUT PROCEDURES

A. General: Refer to Division 1 sections for coordination of closeout work for electrical systems. Sequence closeout procedures properly, so that work will not be endangered or damaged, and so that required performance will be fully tested and demonstrated.

B. Cleaning: After final performance test run of each electrical system, clean system both externally and internally. Touch-up minor damage to factory-painted finishes; refinish work where damage is extensive.

D. General Operating Instructions: Provide general operating instructions for each operational system and equipment item of electrical work.

END OF SECTION 16010

SECTION 16045
ELECTRICAL RELATED WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Provisions of CONCRETE Section apply to the work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of electrical related work required by this section is indicated on drawings and schedules, specified in this or other Division-16 sections or as required by applicable codes or project field conditions.

B. Types of electrical related work specified in this section include the following:

1. Access to Electrical Work:

Access doors in walls and ceilings.
Removable cover plates in walls and ceilings.

2. Excavating for Electrical Work:

Underground electrical wiring.

3. Concrete for Electrical Work:

Encasement of electrical work.
Equipment foundations and mounting pads.
Rough grouting in and around electrical work.
Patching concrete cut for electrical work.

4. Painting of Electrical Work:

Except as specified for individual items of equipment, painting of electrical work is not part of this work.

5. Hangers and Supports for Electrical Work

6. Sleeves for Electrical Penetrations

1.03 QUALITY ASSURANCE

A. Access Units Fire-Resistance Ratings:

1. Where fire-resistance ratings are indicated for construction penetrated by access units, provide UL listed and labeled units.

B. Hangers and Supports

1. Performance Requirements

Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2. Coordination

Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.01 ACCESS TO ELECTRICAL WORK

A. Access Doors, General: Where surfaces must be penetrated for access to electrical work, provide access doors required by project conditions. Furnish sizes adequate for necessary access. Furnish manufacturer's complete units, of type recommended for application complete with anchorages and hardware.

B. Access Door Construction: Fabricate wall/ceiling door units of welded steel construction with welds ground smooth; 16-gage frames and 14-gage flush panel doors, 175 degree swing with concealed spring hinges; flush screw-driver-operated cam locks; factory-applied rust-inhibitive prime-coat paint finish.

C. Removable Access Plates: Provide manufacturer's complete units with anchorages, fasteners, and standard factory-applied finishes.

D. Wall/Ceiling Unit Construction: Provide manufacturer's standard frameless round formed stainless steel or chrome-plated brass low-profile plate cover, with single exposed flush screw anchor, with bright polished finish.

E. Units Set at Grade: Provide manufacturer's standard round or square cast-iron units, with cast-iron pipe extension to protect electrical element being accessed; designed to be set slightly above finish grade, and to be encased in concrete; secure plate to body with bronze screws; natural mill finish on plate and body.

2.02 HANGERS AND SUPPORTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   Cooper B-Line, Inc.
   ERICO International Corporation.
   GS Metals Corp.
   Thomas & Betts Corporation.
   Unistrut; Tyco International, Ltd.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. 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.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

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.

2.04 SLEEVES FOR ELECTRICAL PENETRATIONS

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends

PART 3 - EXECUTION

3.01 ACCESS TO ELECTRICAL WORK

A. Install access units in accordance with manufacturer's written instructions, in compliance with NEC, and with recognized industry practices.

B. Coordinate with other work, including substrate construction work, as necessary to interface installation of access units with other work.

C. Locate removable access unit accurately in relation to work requiring access. Where switches, control devices, pull boxes, and similar elements of electrical work are located within or behind wall or ceiling finishes, or below grade, and are not (cannot be) provided with integral removable access plates, provide removable access plates of types and sizes needed for access requirements.

D. Provide adequate temporary support or attachment to framing or formwork so that units will not be dislocated during construction of substrates.

E. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

F. Adjust hardware and panels after installation for proper operation.

G. Remove and replace panels or frames, which are warped, bowed, or damaged.

3.02 EQUIPMENT FOUNDATIONS AND MOUNTING PADS

A. Provide concrete pedestals, bases, pads, curbs, anchor blocks, anchor bolts, slab inserts, hangers channels, cradles, saddles, etc. for installation of floor mounted electrical equipment such as switchgear, switchboards, transformers.

B. Concrete pads for floor mounted electrical equipment shall be 3.5 inches high.

Concrete pads shall be reinforced with No. 3 steel wire mesh 6 X 6 inches, fastened to structural slabs with 1/2 inch diameter bolts embedded in structural slabs with expansion bolts at all corners (inset 3 inches) and no further apart than 18 inches. Score structural slab thoroughly to assure concrete bonding between structural slab and housekeeping pad. Finish tops of housekeeping pads smooth and level within 1 percent of span. Pads shall be extended at least 4 inches beyond the equipment outline on each side.

3.06 HANGERS AND SUPPORTS

A. Application

1. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

2. 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 in diameter.

3. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted **or** other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

4. Secure raceways and cables to these supports with two-bolt conduit clamps.

5. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.
6. All electrical electrical equipment including conduit and cabling shall be supported properly above ceiling. No electrical equipment shall be supported by other systems including but not limited to sprinkler piping, HVAC ductwork, plumbing piping, ceiling grid, etc.

B. Installation

1. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
2. 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.
3. 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:

To Wood: Fasten with lag screws or through bolts.

To New Concrete: Bolt to concrete inserts.

To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

To Existing Concrete: Expansion anchor fasteners.

Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.

To Light Steel: Sheet metal screws.

4. 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.
5. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.07 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 4 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

I. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves

and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

L. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using **steel** pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

N. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

O. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION

SECTION 16060

DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section includes electrical demolition.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify field measurements and existing circuiting are as shown on Drawings.

B. Verify that wiring and equipment to be disconnected serve only abandoned facilities not required to remain.

C. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Architect/Engineer before disturbing existing installation. Prior to start of demolition, electrician shall request site meeting with engineer to review existing conditions.

D. Coordinate with architectural demolition drawings and remove any/all electrical equipment, conduit, wiring, devices, etc. as required by finished design intent.

3.02 PREPARATION

A. Disconnect electrical systems noted for removal.

B. Coordinate electrical service outages with Owner as specified in Section 16010 – BASIC ELECTRICAL REQUIREMENTS.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Service Continuity: Comply with Section 16010.

E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify

Owner at least 24 hours before partially or completely disabling system. Minimize outage duration. Fire alarm contractor to visit the site prior to start of demolition to coordinate fire alarm demolition requirements.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove abandoned wiring and low voltage cabling to source of supply.

B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

D. Disconnect and remove abandoned panelboards and distribution equipment.

E. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

F. Disconnect and remove abandoned luminaries. Remove brackets, stems, hangers, and other accessories.

G. Repair adjacent construction and finishes damaged during demolition and extension work.

3.04 SALVAGED MATERIALS

A. The Owner shall have the right to salvage demolished equipment and materials. Prior to beginning demolition work, meet with the Owner to determine which items of materials and equipment the Owner wishes to retain.

B. Salvaged items to remain the property of the Owner shall be removed in a manner to prevent damage and packed or crated to protect the items during storage. Salvaged items to remain the property of the Owner shall be delivered to a location on the site designated by the Owner.

C. Other demolished material and equipment shall be removed from the site as and disposed of as specified or described elsewhere in these specifications.

END OF SECTION

SECTION 16111

CONDUIT

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of conduit work is indicated by drawings and schedules.

B. Types of conduit in this section include the following:

1. Rigid metal conduit and fittings.
2. Electrical metallic tubing and fittings.
3. Flexible metal conduit and fittings.
4. Liquid-tight flexible metal conduit and fittings.
5. Non-metallic conduit and fittings.
6. MC cable

1.02 QUALITY ASSURANCE

A. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to conduit.

B. UL Compliance and Labeling: Comply with provisions of UL safety standards pertaining to electrical raceway systems. Provide products and components that are UL listed and labeled.

C. National Electrical Code Compliance: Comply with requirements applicable to construction and installation of raceway systems.

PART 2 - PRODUCTS

2.01 METAL CONDUIT AND TUBING

A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) required for each service indicated.

B. Rigid Steel Conduit: Galvanized heavy wall, non-intermediate.

C. Rigid Metal Conduit Fittings: Threaded type.

D. Electrical Metallic Tubing (EMT): Galvanized steel.

E. EMT Fittings: Steel or malleable iron.

F. Flexible Metal Conduit: Zinc-coated steel, listed as an assembly for grounding as per NEC 250-91B.

G. Flexible Metal Conduit Fittings: Listed assembly for grounding per NEC 250-91B.

H. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; constructed of single strip, flexible, continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coated with liquid-tight jacket of flexible

polyvinyl chloride (PVC).

I. Liquid-Tight Flexible Metal Conduit Fittings: ANSI/NEMA FB1.

J. MC cable (non-patient care areas) - Type MC-Neutral per Phase Cable by AFC cable Systems or prior approved equal. MC cable shall be steel, have an outer armor identification system that matches the building system voltage indentification. Copper conductors shall be #12 THHN minimum and have a color coded phasing insulation and contain an insulated green #12 equipment ground.

K. MC cable (patient care areas) - Type MC-Stat Cable by AFC cable Systems or prior approved equal. MC cable shall be steel, have an outer armor identification system that matches the building system voltage indentification. The outer armor shall be listed as an equipment ground as per NEC section 517.12 (A) and (B) redundant grounding system. Copper conductors shall be #12 THHN minimum and have a color coded phasing insulation and contain an insulated green #12 equipment ground and full size aluminum grounding conductor.

2.02 NONMETALLIC CONDUIT AND FITTINGS

A. General: Provide nonmetallic conduit, ducts and fittings of types, sizes and weights (wall thickness) required for each service indicated.

B. Non-Metallic Conduit: NEMA TC2, schedule 40 PVC.

C. Non-Metallic Conduit Fittings & Conduit Bodies: ANSI/NEMA TC 3, solvent welded match to conduit type and material.

D. Underground Plastic Utilities Duct: ANSI/NEMA TC 6, Type 1 for encased burial in concrete.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL CONDUIT

A. Install conduit as indicated, according to manufacturer's written instructions.

B. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.

C. Keep raceways at least 6 inches away from parallel runs of hot water pipes. Install horizontal raceway runs above water piping.

D. Install raceways level and square and at proper elevations. Provide adequate headroom.

E. Complete raceway installation before starting conductor installation.

F. Use temporary closures to prevent foreign matter from entering raceway.

G. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab. Provide bushings for ends of all conduit stub-ups.

H. Make bends and offsets so the inside diameter is not reduced. Keep the legs of a bend in the same plane and the straight legs of offsets parallel.

I. Raceways Embedded in Slabs: Install in middle third of the slab thickness where practical, and leave at least 1-inch concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in the concrete.
3. Run conduit larger than 1-inch trade size under concrete slab.

J. Install raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports.

2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.

K. Join raceways with fittings designed and approved for purpose, make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.

2. Use insulating bushings to protect conductors.

L. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely, and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

M. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.

N. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-lb tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

O. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semi recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid tight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

P. Install expansion joints where conduit crosses building expansion joints.

Q. Furnish and install pull boxes as required for installation of wiring. Boxes shall be code gauge galvanized steel with screw attached access panels.

3.02 CONDUIT INSTALLATION SCHEDULE

A. Underground Installations: Use PVC or rigid steel conduit. Conduit rising from horizontal underground or in slab runs shall have rigid steel conduit, risers, ells and bends. Conduits installed under building slab on grade elevation shall be buried under the vapor barrier out of the concrete pour and a minimum of 12" below the top of slab. All other underground conduit runs shall be buried minimum 24" below grade and covered with red concrete 3” all around.

B. In Slab Above Grade: PVC or Rigid steel conduit, 3/4" maximum size.

C. Outdoor Locations, Above Grade: Galvanized rigid steel (GRS).

D. Dry Interior Locations: Electrical metallic tubing.

E. Use flexible metal conduit for final connections to motors and for other electrical equipment subject to movement or vibration - 24" maximum length each connection.

F. Install liquid-tight flexible conduit for connection of motors and for other electrical equipment (24" maximum length) where subject to movement and vibration and also where subject to one or more of the following conditions:

1. Exterior location.
2. Moist or humid atmosphere where condensate can be expected to accumulate.
3. Subjected to water spray.
4. Subjected to dripping oil, grease, or water.

3.03 INSTALLATION OF MC CABLE

A. Install raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports.

B. Utilize fittings designed and approved for purpose, make all connections tight.

1. Make terminations tight. Use bonding bushings or wedges at connections subject to vibration.

2. Use insulating bushings to protect conductors.

C. Support cable as per NEC and utilize supports approved for MC cable installations. This shall include but not be limited to above ceiling, concealed or exposed routing.

D. **The use of MC cable is not allowed for any emergency circuits.**

E. **All MC cable utilized in patient care areas is to be hospital grade type, see section 3.03, C above. This includes lighting circuiting and lighting whips.**

END OF SECTION

SECTION 16120

BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. Extent of wire and cable work is indicated by Drawings and schedules.

1.02 RELATED DOCUMENTS:

A. Drawings, General provisions of Contract, General and Supplementary Conditions, and Division 1 Specification Sections apply to work of this section.

1.03 QUALITY ASSURANCE

A. Comply with National Electrical Code requirements applicable to construction, installation and color-coding of wires and cables. Provide products that are UL listed and labeled.

PART 2 - PRODUCTS

2.01 WIRE AND CABLE:

A Provide wire, cable and connectors of manufacturer's standard materials, designed and constructed as recommended by manufacturer for a complete installation and for the application indicated. Except as noted in Paragraph B below, the conductors shall be in accordance with the following schedule:

600 volt Building Cable and Wire: Copper –Conductors shall be soft or annealed copper. THHN/THWN insulated and rated for up to 600 volts for conductors # 1 AWG and smaller. Provide solid conductors for # 12 and # 10, stranded for # 8 AWG and larger.

2.02 COLOR CODING:

A. Branch circuit conductors shall have colored insulation. Except for ground and grounding conductors, larger conductors shall be taped with the appropriate color tape for a minimum 10” starting from the termination.

B. Except as noted in Paragraph C below, color coding for conductors shall be as in the following table:

Conductor	208Y/120 V	480Y/277V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray

Ground	Green	Green
Isolated Ground	Green with yellow tracer	

C. Ground and grounding conductors shall have green colored insulation throughout, regardless of size.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install electrical cables and wires as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.

B. Install all wiring in conduit.

C. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface. Do not pull conductors into raceways until raceway system is complete

D. Pull conductors together where more than one is being installed in a raceway.

E. Use pulling means including fish tape, cable or rope that will not damage raceway. Use pulling compound or lubricant, where necessary. Compound must not deteriorate conductor or insulation.

F. Do not splice feeder conductors.

G. Use splice and tap connectors that are compatible with conductor material.

H. In general, conductors shall be of the same size from the last protective device to the load. Branch circuit conductors shall not be smaller than #12 AWG. Conductors for 20 amp branch circuits of 120 volts, more than 75 ft. long (to the first fixture or other current-consuming outlet), and of 277 volt, more than 150 ft. long (to the first fixture of other current consuming outlet) shall be No. 10 AWG.

3.2 FIELD QUALITY CONTROL:

A. Prior to energization, test cable and wire for continuity of circuitry, and also for short circuits. Correct malfunctions when detected.

END OF SECTION

SECTION 16130

BOXES AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of box and associated fitting work is indicated by drawings.

B. Types of boxes and fittings in this section include the following:

1. Outlet boxes.
2. Junction boxes.
3. Pull boxes.
4. Bushings.
5. Locknuts.
6. Knockout closures.

1.02 QUALITY ASSURANCE

A. Comply with National Electrical Code requirements applicable to construction and installation of electrical wiring boxes and fittings.

B. Provide electrical boxes and fittings that are Underwriters Laboratories listed and labeled.

C. Comply with applicable requirements of NEMA standards pertaining to outlet and device boxes, covers and box supports.

PART 2 - PRODUCTS

2.01 FABRICATED MATERIALS

A. Outlet Boxes (concealed conduit): Provide galvanized coated flat rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as required by particular application, suitable for installation at respective locations. Construct outlet boxes with mounting holes, and with conduit size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding.

Outlet and device boxes shall be mounted securely to structure by means of brackets. Brackets shall provide “far-side” support to each side of box.

B. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation

requirements for individual wiring situations.

C. Device Boxes (concealed conduit): Provide galvanized coated flat rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes suitable for installation at respective locations. Device boxes for receptacles, telephone, and communications shall be not less than 4" square and 1 1/2: deep with box extension ring as required by number of devices served. Construct device boxes for flush mounting with mounting holes, and with conduit size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide corrosion resistant screws for grounding.

D. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations.

E. Outlet and Device Boxes (exposed conduit): Provide corrosion resistant cast metal raintight outlet and wiring device boxes, of types, shapes and sizes required for each application, including depth of boxes, with threaded conduit holes for fastening electrical conduit, and cast metal face plates. Where weatherproof devices are indicated, provide spring hinged watertight caps suitably configured for each application, including faceplate gaskets and corrosion resistant plugs and fasteners.

F. Bushings, Knockout Closures, and Locknuts: Provide corrosion resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications.

2.02 JUNCTION AND PULL BOXES

A. Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers, of types, shapes and sizes, to suit each respective location and installation, with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

A. General: Install electrical boxes and fittings in accordance with manufacturer's written instructions, applicable requirements of the NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices.

B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.

C. Provide weathertight outlet boxes for interior and exterior locations exposed to

weather.

D. Provide knockout closures to cap unused knockout holes where blanks have been removed.

E. Install boxes to ensure ready accessibility to enclosed electrical wiring.

F. Avoid installing boxes back-to-back in walls. Provide not less than 6" separation.

G. Position recessed boxes accurately to allow for surface finish thickness.

H. Round boxes are not acceptable where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surface.

I. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed boxes in concrete or masonry.

END OF SECTION

SECTION 16143

WIRING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. The work of this section consists of providing labor, materials, tools, appliances and miscellaneous accessories for wiring device work indicated by Drawings and schedules.

B. Types of electrical wiring devices in this section include the following:

1. Receptacles.
2. Ground-fault circuit interrupters.
3. Switches.
4. Wallbox dimmer switches
5. Occupancy Sensors
6. Wallplates.

1.02 SUBMITTALS

A. Provide submittals for review by Architect. Provide manufacturer's data for wiring devices and cover plates. Clearly indicate model number proposed. Provide lighting control shop drawing including floor plan with lighting control layout included all devices and connections.

PART 2 - PRODUCTS

2.01 FABRICATED WIRING DEVICES:

A. Provide factory-fabricated wiring devices in types, colors, and electrical ratings for applications indicated, complying with NEMA Stds. Pub. No. WD 1. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements. Notwithstanding colors indicated in catalog numbers shown below, devices and cover plates shall be provided in colors selected by architect at time of material submittal.

B. Receptacles:

1. Duplex: Provide duplex "specification grade" receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke and mounting yoke provided with automatic grounding feature between mounting screws and yoke, 20-amperes, 125-volts, with metal plaster ears, back and side wiring, NEMA configuration 5-20R unless otherwise indicated. Hubbell #5362 I, Leviton 5362 I, or approved equal.

2. Duplex, Ground-Fault Interrupter: Provide "specification grade" duplex receptacles, ground-fault circuit interrupters (GFCI), feed-through type, capable of protecting connected downstream receptacles on single-circuit, grounding type UL-rated Class A, 20-amperes rating, 120-volts, 60 Hz, with solid-state ground-fault sensing and signaling, with 5 milliamperes ground-fault trip level; equip with 20-ampere plug configuration, NEMA 5-20R and with local test/reset buttons. Receptacles shall be by same manufacturer as duplex receptacles, Hubbell GF 5362 I, Leviton 689HG1 or approved equal.

3. Quad Outlet, Hospital Grade: Provide two single hospital grade duplex receptacles in box with one-piece cover plate.

4. Duplex – Hospital Grade: Provide duplex "specification grade" hospital grade receptacles, 2-pole, 3-wire grounding, with green dot. Provide ivory or brown color on face for normal power receptacles, and red color on face for emergency powered receptacles. Include green hex-head equipment ground screw, with automatic grounding feature between mounting screws and yoke, 20-amperes, 125-volts, with metal plaster ears (back and) side wiring, NEMA Configuration 5-20R unless otherwise indicated. Hubbell HBL8300I, Leviton 8300I, or approved equal.

5. Duplex, Ground-Fault Interrupter – Hospital Grade: Provide "specification grade" hospital grade duplex receptacles, ground-fault circuit interrupters (GFCI), feed-through type, capable of protecting connected downstream receptacles on single-circuit, grounding type UL-rated Class A, 20-amperes rating, 120-volts, 60 Hz, with solid-state ground-fault sensing and signaling, with 5 milliamperes ground-fault trip level; equip with 20-ampere plug configuration, NEMA 5-20R and with local test/reset buttons. Receptacles shall be by same manufacturer as duplex receptacles.

6. Duplex – Safety Type: Levition TCR20-I or equal by Hubbell.

7. Duplex – Hospital Grade, Safety Type Leviton 8300-SGI or equal by Hubbell.

8. Duplex – Hospital Grade, Safety Type, Ground Fault Interrupting: Leviton 16262-SGI or equal by Hubbell.

9. Deadfront GFCI – 20 amp, ivory self test deadront (blank face) GFCI Outlet: Legrand 2087I, Eaton SGFD20V, or equal by Hubbell)

C. Switches:

1. Single Pole Toggle: Provide "specification grade" flush, quiet, AC-type, single-pole toggle switches, 20-amperes, 277/125 volts AC, with mounting yoke insulated from mechanism; equip with plaster ears, switch handle, side-wired screw terminals (and backwiring with clamp type

terminals). Hubbell 1221 I, Leviton 1221 I, or approved equal.

2. Three-Way Toggle: Provide "specification grade" flush, quiet, AC-type, three-way toggle switches, 20-amperes, 277/125 volts AC, with mounting yoke insulated from mechanism, with plaster ears, switch handle, side-wired screw terminals (and backwiring with clamp type terminals). Manufacturer shall be same as for single pole switches, Hubbell 1223 I, Leviton 1223 I, or approved equal.

3. Pilot Light Switches: Provide "specification grade" flush, quiet, AC-type, single-pole toggle switches, 20-amperes, 277/125 volts AC, with pilot light (light on when load is on): Hubbell 1221PL, Leviton 1221PL, or approved equal.

4. Wallbox Dimmer Switches: Provide extra heavy use, specification grade Wallbox dimmer switches, Greengate WBSD-010M-C1 or equal by Lutron. All dimmers shall be compatible for the type of lamp technology it is serving and sized for the load served.

5. Wallbox Dimmer Switch with integrated occupancy sensor: Greengate OSW-D-010-* or equal by Lutron. All dimmers shall be compatible for the type of lamp technology it is serving and sized for the load served.

6. Toggle switch with integrated occupancy sensor, dual tech: Greengate OSW-D-* or equal by Lutron.

7. Occupancy sensors: Dual tech, ceiling sensors – Cooper OAC-DT or equal by Lutron. Provide all power packs as required.

2.02 WIRING DEVICE ACCESSORIES:

A. Wall Plates: Provide wall plates for wiring devices, of types, sizes, and with ganging and cutouts as indicated on drawings (or schedules). Construct with metal screws with countersunk heads for securing plates to devices, screw heads colored to match finish of plates.

1. Material and Finish: Verify with Architect.

B. Weatherproof Device Covers: Provide heavy duty, while-in-use covers with weatherproof gasket.

PART 3 - EXECUTION

3.01 INSTALLATION OF WIRING DEVICES/PLATES:

A. Install wiring devices in compliance with manufacturer’s written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.

B. Coordinate with other work, including painting, box and wiring work, as necessary to interface installation of wiring devices with other work, furniture locations, and door swings.

C. Verify location of all devices with Architect before rough-in. See architectural elevations for detail.

D. Install wiring devices only in electrical boxes, which are clean, free from, excess building materials, dirt, and debris.

E. Install weatherproof covers at all damp or exposed locations, as indicated on drawings. Covers shall be heavy duty, while in use type.

F. Install wiring devices after wiring work is completed.

G. Install wall plates after painting work is completed.

H. Protect wiring devices during painting. Wiring devices shall remain free of paint.

I. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16" from the vertical or horizontal.

J For receptacle and switches that are not the end of the line, the equipment-grounding conductor shall not route through the device per NEC 250-114. Splice from the incoming conductor in the box with one conductor going to the device and one continuing to the next device on the run such that the device can be removed without losing the ground connection to the downstream devices.

K For multiwire branch circuits (multiple phases sharing a common neutral) that are not the end of the line, the neutral conductor shall not route through the receptacle per NEC 300-13 (b). Splice from the incoming neutral conductor in the box with one conductor going to the device and one continuing to the next receptacle on the run such that the device can be removed without losing the neutral connection to the downstream devices.

L. Provide hospital grade devices in all patient care areas.

M. All lighting controls shall meet IECC 2021. Provide all relays, switches, occupancy sensors, wiring, dimming, photo control, etc. as required to meet IECC 2021. Provide all programming as required.

3.02 PROTECTION OF WALL PLATES AND RECEPTACLES: Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Substantial Completion, replace those items, which have been damaged, including those burned and scored by faulty plugs and those having paint or carpet adhesive.

3.03 GROUNDING: Provide electrically continuous, tight grounding connections for wiring devices, unless otherwise indicated.

3.04 TESTING: Prior to energizing circuitry, test wiring devices for electrical continuity, tension, and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.

END OF SECTION

SECTION 16170

CIRCUIT & MOTOR DISCONNECTS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of circuit and motor disconnect switch work is indicated on drawings.

1.02 QUALITY ASSURANCE

A. Comply with National Electrical Code requirements pertaining to construction and installation of electrical circuit and motor disconnect devices.

B. Comply with requirements of UL 98, "Enclosed and Dead-Front Switches". Provide circuit and motor disconnect switches that are UL listed and labeled.

PART 2 - PRODUCTS

2.01 FABRICATED SWITCHES

A. Disconnect Switches: Provide heavy-duty surface mounted, sheet-steel enclosed switches, of types, sizes and with fusing and other electrical characteristics indicated or required. Switches shall be rated 240 volts for use on 208Y/120 volt systems and 600 volts for use on 480Y/277 volt systems, 60 Hz, with blades, and poles as required for their application. Units shall incorporate spring assisted, quick-make, quick-break switches, which are constructed so that switch blades are visible in OFF position with door open. Equip each unit with an operating handle that is an integral part of enclosure base, whose operating position is easily recognizable, and which is capable of being padlocked in OFF position. Construct current carrying parts of high-conductivity plated copper. Unless noted otherwise, provide NEMA Type 1 enclosures for interior use and NEMA Type 3R enclosures for exterior use. Switches shall be Square D Class 3110, Cutler Hammer Type DH, Siemens VBII, General Electric Type TH, or approved equal.

2.02 FUSES FOR FUSIBLE SWITCHES

A. Fuses for circuits 601 amps and larger shall be UL listed Class L with time delay feature, with an interrupting rating of 300,000 amperes.

B. Fuses for circuits 600 amps and less shall be UL Listed Class R time delay fuses with an interrupting rating of 300,000 amperes. Class R fuses shall be true dual element, time delay fuses, full sized with end caps that can be tested to determine if the fuse is blown. Fuses shall be indicating type where noted below.

C. Fuses for safety switches protecting panelboards shall be UL listed Type Class RK-1, indicating type, with time delay feature.

D. Fuses for 480-volt motor circuits shall be 600 volt, Class RK1, indicating type.

E. All other fuses shall be dual element time delay type UL listed Type Class RK-5.

F. Fuses for switches used as disconnecting means for motors and other equipment shall be sized in accordance with the nameplate requirements of the equipment actually installed.

PART 3 - EXECUTION

3.01 INSTALLATION OF CIRCUIT AND MOTOR DISCONNECT SWITCHES

A. Install circuit and motor disconnect switches in compliance with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and recognized industry practices.

B. Install disconnect switches for use with motor-driven appliances, and motors and controllers within sight of controller position.

C. Provide etched laminated label on each disconnect switch. Label shall identify equipment served by the switch.

3.02 GROUNDING

A. Provide equipment-grounding lugs in all switches with connections, sufficiently tight to assure a permanent and effective ground.

3.03 FIELD QUALITY CONTROL

A. Subsequent to completion of installation of electrical disconnect switches, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest.

END OF SECTION

SECTION 16195

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 Summary

A Section Includes identification of electrical products.

1.04 Scope of Work

A. Provide manufacturer's standard equipment nameplates, permanently affixed, indicating manufacturer's product data information, including model and serial number information, electrical ratings and information required by the various independent testing organizations, such as Underwriters Laboratories Inc., and industry standards organizations, such as the National Electrical Manufacturers Association.

B. In addition to the manufacturer's nameplates, provide identification of electrical system equipment as specified and indicated on the drawings including, but not limited to, each transformer, switchboard, branch circuit and distribution panelboard, transformer, lighting contactor, equipment cabinet, fire alarm panel or battery cabinet, access control cabinet, disconnect switch, and wiring device faceplates. Provide all labeling as required by NEC.

PART 2 - PRODUCTS

2.01 Identification Materials

A. Engraved Plastic-Laminate Signs

1. Provide engraving stock, melamine gray plastic laminate face color and white core plies (letter color).

2. Provide minimum 1/16-inch thickness for signs up to 20 square inches or 8 inches length and 1/8-inch thickness for larger units.

3. Provide 1/4-inch high lettering with lines of information as specified.

4. Provide 1/4-inch black border around outside edge of sign.

5. Punch label for mechanical fastening and provide self-tapping stainless steel screws, except where screws cannot or should not penetrate substrate.

B. Cable/Conductor Identification Bands: Provide vinyl-cloth, self-adhesive marker band of wrap-around type, either pre-numbered plastic coated type, or type-on type with clear plastic self-adhesive cover flap.

C. Plastic Signs: Provide self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instruction or warnings, of sizes suitable for application areas and adequate for visibility.

D. Labeling For Receptacle And Switch Cover Plates: Laminated, scratch resistant, 1/2” wide polyester adhesive backed tape, Panduit LS4M, Brother P-Touch labeling system, or equal system approved by the Owner. Verify finish with owner.

E. See electrical drawings for more labeling requirements for transformers, panelboards, and disconnect switches.

PART 3 - EXECUTION

3.01 Installation

A. Refer to equipment and system specification sections for specific identification installation requirements.

B. Thoroughly clean surface to which identification material will be affixed.

C. Plastic-Laminate Sign Installation

1. Securely fasten to equipment utilizing screws or contact-type adhesive for equipment conditions, which should not or cannot penetrate the equipment.

2. Mount signs on equipment front exteriors to be easily viewed. Mount signs for different but adjacent equipment and for common equipment lineups, such as substation, at the same height above finished floor.

D. Provide a permanent label on the faceplate of each addressable fire alarm device indicating the devices complete address. Labeling shall be as described in Paragraph 2.1 D above.

END OF SECTION

SECTION 16452

GROUNDING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Provide grounding as indicated on the drawings or required by this section.

1.02 QUALITY ASSURANCE

A. Comply with National Electrical Code requirements applicable to materials and installation of electrical grounding systems, associated equipment and wiring.

B. Comply with applicable requirements of UL Standards Nos. 467 and 869 pertaining to grounding and bonding. Provide products that are UL listed and labeled.

C. Comply with applicable requirements of IEEE Standard 142 and 241 pertaining to electrical grounding.

PART 2 - PRODUCTS

2.01 GROUNDING SYSTEMS

A. Materials and Components, General: Provide electrical grounding materials and accessories needed for complete installation. Provide products complying with NEC, UL, IEEE, and established industry standards for applications indicated.

B. Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL GROUNDING

A. General: Install electrical grounding systems in accordance with applicable portions of NEC, with NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements and serve intended functions.

B. Coordinate with other electrical work as necessary to interface installation of electrical grounding system with other work.

C. The equipment grounding terminal buses of the normal and essential branch-circuit panelboards serving the same individual patient care vicinity shall be connected together with an insulated continuous copper conductor not smaller than 10 AWG. Where two or more panelboards serving the same individual patient care vicinity are served from separate transfer switches on the essential

electrical system, the equipment grounding terminal buses of those panelboards shall be connected together with an insulated continuous copper conductor not smaller than 10 AWG. This conductor shall be permitted to be broken in order to terminate on the equipment grounding terminal bus in each panelboard.

D. See Imaging Equipment drawings for grounding requirements of Imaging Equipment.

3.02 EQUIPMENT GROUNDING CONDUCTORS

A. Install a separate grounding conductor, sized in accordance with NEC Table 250.122, run in the conduit with the circuit conductors for all circuits.

END OF SECTION

SECTION 16470

PANELBOARDS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of panelboard and enclosure work is indicated by drawings and schedules.

1.02 QUALITY ASSURANCE

A. Comply with National Electrical Code requirements applicable to installation of panelboards, cabinets, and cutout boxes.

B. Comply with UL requirements pertaining to panelboards, accessories and enclosures. Provide panelboards that are UL listed and labeled.

C. Comply with applicable NEMA Standards for panelboards.

1.03 SUBMITTALS

A. Provide manufacturer's data on panelboards to verify compliance with requirements of the drawings and this specification.

PART 2 - PRODUCTS

2.01 PANELBOARDS

A. Provide panelboards, enclosures and ancillary components of types, sizes, and ratings indicated which comply with manufacturer's standard materials, design and construction in accordance with published product information. Equip with proper number of unit panelboard devices as required for complete installation. Where types, sizes or ratings are not indicated, comply with NEC, UL and established industry standards for those applications indicated.

B. Distribution, Lighting and Appliance Panelboards: Provide dead-front safety constructed factory assembled circuit breaker type panelboards in sizes and ratings as indicated. Construct with plated rectangular shaped copper bus bars that are securely mounted and braced. Provide anti-turn solderless pressure type lug connectors approved for copper conductors for connecting feeders. Equip with full-sized neutral bus bar with suitable lugs for circuits requiring neutral connection. Provide circuit breakers in accordance with schedules shown on drawings. Breakers shall be molded case bolt-in type, heavy-duty, quick-make, quick-break, with toggle handles that indicate when tripped. Where multipole breakers are indicated, provide with common trip so that overload on one pole will trip all poles simultaneously. Provide GFCI, AFCI or combination GFCI/AFCI circuit breakers where called for. Provide lugs on neutral bus for

each outgoing circuit or feeder required. Provide bare uninsulated grounding bars suitable for bolting to enclosures with suitable lugs for incoming and outgoing equipment grounding conductors. Load center type panelboards are not acceptable.

C. Panelboard Enclosures: Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types indicated, code-gage, minimum 16-gage thickness, minimum 20" wide. Construct with multiple knockouts and wiring gutters. Provide fronts with adjustable trim clamps, and doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed piano door hinges. Equip with interior circuit-directory frame, and card with clear plastic covering. Provide baked gray enamel finish over a rust inhibitor coating. Design enclosures for recessed or surface mounting as noted on the drawings.

D. Panelboard Accessories: Provide panelboard accessories and devices including, but not necessarily limited to circuit breakers as recommended by panelboard manufacturer for ratings and applications indicated.

E. Panelboards shall be as shown in the following schedule and shall be completely factory assembled. Do not purchase panelboards or cabinets until submittals have been approved.

Branch Circuit Panelboards (120/208 Volt Operation)

Square D NQ Series or equal by Eaton

Branch Circuit Panelboards (277/480 Volt Operation)

Square D NF Series or equal by Eaton

Distribution Panelboards (600 Amp Mains & Larger)

Square D I-Line HC Series or equal by Eaton

F. Where a specific interrupting rating is shown on the drawings, panelboards and associated circuit breakers shall be rated for that value as a minimum. Circuit breakers with non-UL listed ratings are not acceptable. Maintaining required interrupting rating through series rating of devices is not acceptable.

G. All panelboards shall be in a single enclosure. Double section panelboards are not to be used.

H. Panelboard doors shall have a locking latch and shall be keyed alike for the entire project.

I. Where surge protective devices are shown on the drawings, provide a surge protection device mounted internal to the panelboard per manufacturers recommendations. All panelboards connected to the essential branch system (life safety, critical, equipment) shall have panel mounted surge protective devices

regardless if not shown on drawings.

J. Provide labeling per electrical drawings.

K. For circuit breakers rated 1200 amps and larger, provide Arc Energy Reduction means to meet NEC 240.87.

PART 3 - EXECUTION

3.01 INSTALLATION OF PANELBOARDS

A. General: Install panelboards and enclosures in accordance with manufacturer's written instructions, applicable requirements of NEC standards and NECA's "Standard of Installation", and in compliance with recognized industry practices.

B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torque specified in UL Std. 486A.

C. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secure.

D. Provide properly wired electrical connections within enclosures.

E Fill out panelboard circuit directory cards upon completion of installation work. Type text, handwriting is not acceptable.

F. Provide engraved laminated plastic nameplate for each panel - white, with black letters. Provide label stating where panel is fed from.

3.02 GROUNDING

A. Provide grounding connections. Tighten connections to comply with tightening torque specified in UL Std. 486A to assure permanent and effective grounds.

3.03 FIELD QUALITY CONTROL

A. Prior to energization of circuitry, check all accessible connections to manufacturer's tightening torque specifications.

B. Prior to energization check with ground resistance tester phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.

C. Prior to energization, check for electrical continuity of circuits, and for short circuits.

D. After wire and cable hook-ups, energize panelboards and demonstrate

functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

END OF SECTION

SECTION 16500

LIGHTING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of lighting fixture work is indicated by drawings and schedules.

1.02 QUALITY ASSURANCE

A. Comply with National Electrical Code requirements applicable to installation and construction of lighting fixtures.

B. Provide lighting fixtures that are UL listed and labeled.

1.03 SUBMITTALS

A. Provide manufacturer's data on lighting fixtures including complete catalogue data, photometrics and other data necessary to describe the fixture proposed. Submit data in booklet form with separate sheet for each fixture assembled in alphabetical order, with proposed fixture and accessories clearly indicated on each sheet.

PART 2 - PRODUCTS

2.01 LIGHTING FIXTURES

A. General: Provide lighting fixtures, of sizes, types and ratings indicated; complete with housings, lamps, lampholders, reflectors, ballasts, starters and wiring

B. Comply with additional fixture and lamp requirements included in the Lighting Fixture Schedule shown on drawings.

C. For fixtures that are recessed ceiling mounted, provide National Electrical Code required thermal safety cutout devices. For ballast powered fixtures, the thermal protection may be part of the ballast assembly only if the ballast is mounted at the lamp housing, otherwise use a separate thermal protection device clamped to the lamp housing. Fixtures so protected shall be suitable marked.

2.02 LAMPS

A. Unless noted otherwise on the drawings, lamps installed in each fixture shall be of the type specifically recommended by the manufacturer of the fixture for use in the fixture.

PART 3 - EXECUTION

3.01 INSTALLATION OF LIGHTING FIXTURES

A. Install lighting fixtures at locations and heights indicated, in accordance with fixture manufacturer's written instructions and NECA's "Standard of Installation.

B. Support each fixture directly from building structural members independent of any ceilings or other installed item. Provide supplemental angle or channel trapeze supports required to span across piping, ductwork or other objects where direct above the fixture support is not possible. Do not attach to ductwork. Ceiling framing members shall not be used to support fixtures except in specific areas where ceiling supports for this purpose have been specified elsewhere in this specification. Lighting fixtures shall be permanently installed and connected to the wiring system.

C. Provide a minimum of 4 feet, but not more than 6 feet, of steel constructed flexible metal conduit between the last branch wiring junction box and the junction box at the fixture. Do not loop from fixture to fixture with flexible conduit. Where lighting is located in patient care areas, whips shall be hospital grade MC Cable.

D. Provide an approved access panel of type, configuration and finish approved by the Architect for fixtures and accessories requiring access above inaccessible ceilings

3.02 ADJUST AND CLEAN

A. Clean lighting fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during remainder of construction period.

3.03 FIELD QUALITY CONTROL

A. After completion of installation of lighting fixtures, and after circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

END OF SECTION

SECTION 16720

FIRE ALARM SYSTEM

PART 1 - GENERAL REQUIREMENTS

1.01 SCOPE OF WORK:

A. The scope of work includes the design and documentation of complete extensions and modifications to the existing fire alarm system. It includes the furnishing and installation of all components necessary to provide fire detection, occupant notification, emergency forces notification, communication and fire safety functions to meet the requirements of the drawings, these specifications, applicable building codes, NFPA 72, and the requirement of all authorities having jurisdiction.

B. The contract documents depict the scope of the work and set forth minimum requirements and standards for the system. In the event there is a conflict between the minimum standards of the contract documents and the requirements of the AHJ, the requirements of the AHJ shall apply.

1.02 QUALITY ASSURANCE:

A. Standards: The following apply as minimum standards for the work:

NFPA 70	National Electrical Code
NFPA 72	Standard for the Installation, Maintenance and Use of Protective Signaling Systems.
ADA-AG	Americans with Disabilities Act - Accessibility Guidelines

B. All devices, combinations of devices, notification appliances, control panel components, and other equipment utilized shall be listed by the Underwriters Laboratories, Inc. (UL) for the protective signaling purpose for which they are used, including listing for use with the existing fire alarm control panel.

C. The fire system equipment shall be installed by NICET certified installers. The Installer, who performs final checkout, contractual service and testing, shall be Listed and Authorized by UL to provide services for alarm system certification as a means of identifying compliance with applicable NFPA Standards.

1.03 FIELD VERIFICATION OF EXISTING CONDITIONS

A. Field verify location of all existing devices including initiating devices, notification appliances, control modules, wiring, and power supplies. Actual locations, quantities, and interconnection of existing devices to remain in use shall be reflected in submittal drawings.

1.04 TESTING OF EXISTING SYSTEM

A. Perform tests prior to beginning work to determine the actual condition of the existing system including wiring, control panel and components and devices. Deficiencies found shall be included in a written report to the Architect. Testing shall be completed and the report provided to the Architect within 14 days from the notice to proceed with the work. The Architect will refer deficiencies contained in the initial report to the Owner for correction by the Owner prior to the beginning of the work.

1.05 SUBMITTALS & CERTIFICATION

A. Provide submittal documents and drawings for review by the Architect and the Louisiana State Fire Marshal. Submittal documents and installation drawings shall be prepared by the contractor to comply with the system documentation standards set forth in NFPA 72, the contract documents, and shall comply with all requirements of the reviewing agencies. These documents and drawings shall be submitted to the architect for review and to the reviewing authorities for approval prior to beginning work.

B. When all work has been completed, the Installer shall so certify to the Owner in writing. Include a copy of the certification in the Project Documentation. Certification shall be in accordance with NFPA 72. As a condition for final acceptance, the control panel shall be tagged with the green tag required by the Fire Marshal for occupancy and system operation.

PART 2 - FIRE ALARM SYSTEM AND SYSTEM EQUIPMENT

2.01 SYSTEM FUNCTION

A. The finished system shall be complete and electrically supervised.

2.02 SYSTEM ALARM OPERATION

A. Activation of any fire alarm initiating device or alarm-causing intelligent interface module shall result in the alarm initiating and fire safety functions required of the system.

B. Fire Safety Functions: The fire alarm system shall interface with the HVAC control system and the access control system. HVAC equipment interface is defined by the sequence of operations for the HVAC system. Access control requirement shall consist of releasing locked doors in the egress path under alarm conditions. In addition, the fire alarm system shall release magnetic hold-opens in rated openings under alarm conditions. Smoke detection is required at smoke dampers and other duct locations indicated on the mechanical drawings.

2.03 FIRE ALARM CONTROL PANEL:

A. The existing fire alarm control panel shall be modified to provide the functions specified. The assembly shall utilize the existing power supply and battery charger with optional modules including external or remote power supplies necessary to meet the requirements of these specifications.

B. The standby power source shall meet the requirements for standby capacity as detailed in paragraph 1-5.2.6, NFPA 72, supervisory for 60 hours for auxiliary and remote station systems. Additionally, the supply shall be capable, at the end of this period of operating the system with all evacuation appliances active for a period of five minutes using conventional signaling or fifteen minutes using voice evacuation.

C. Provide new Fire Alarm Remote Power Supplies and transponders as required and connect to existing fire alarm control panel as required.

D. Provide all required programming of existing fire alarm panel as required by new work.

2.06. SYSTEM INTELLIGENT ALARM INITIATION DEVICES AND CONTROL MODULES:

A. Each remote device shall have a microprocessor with non-volatile memory to support its functionality and serviceability. Each device shall be capable of electronic addressing, either automatically or application programmed assigned, to support physical/electrical mapping and supervision by location. Setting a device's address by physical means shall not be necessary. The system shall include an isolation module for every group of 25 or less addressable devices.

B. Smoke Detectors shall be listed for use as open area protective coverage and shall be insensitive to air velocity changes. Detectors shall be addressable type mounted in in-duct housing. Where duct smoke detectors are mounted above ceilings or otherwise obstructed from normal view, they shall be provided with a remote alarm indicator.

C. Heat Detectors shall be rated at 135 degrees.

D. Detector bases shall be low profile twist lock types with screw clamp terminals and self-wiping contacts.

E. Provide Manual stations where shown. Install stations within five feet of egress doors. If not achievable, confirm location on site with engineer.

F. Provide control modules as required for the application.

2.07. EVACUATION SIGNALING APPLIANCES:

Visual Notification Appliances:

Visual appliances shall be installed as in accordance with the requirements of the U.L. 1971 standard and NFPA 72. Where multiple visual signals are visible from any location, circuitry shall be incorporated for the synchronization of the flash rate.

Devices shall be UL 1971 Listed for Emergency Devices for the Hearing-Impaired in all public mode installations, and shall produce a flash rate of one (1) flash per second minimum over the listed input voltage (20 VDC - 31 VDC) range. All visual signals shall incorporate a Xenon flash tube enclosed in a rugged lens with solid-state circuitry. The

strobe intensity shall be rated per UL 1971 for 15, 30, 75, 90, or 110 Candela. All devices shall include selectable candela intensity.

The strobes shall be available for semi-flush or surface mounting and in conjunction with audible signals.

Audible evacuation signals:

Audible Notification appliance shall be electronic and use solid-state components. Each electronic signal shall provide for a temporal code three ANSI universal evacuation signal when activated. The signal shall be synchronized using synchronization technology or master pulsing from the power source. Each device shall provide output sound level of 85 or 100 db or as required by NFPA 72 for public mode signaling in public occupied areas.

In addition to other visual notification appliances required by the drawings and specifications, provide a quantity of 12 devices, each having selectable candela ratings. Install these devices in locations as may be required by the Fire Marshal either at the time of submittal review or during the Fire Marshal's inspection of the work. If the additional devices are not required by the Fire Marshal, deliver them to the Owner for use as spares.

PART 3 - EXECUTION

3.01 CONTINUITY OF SERVICE

A. The existing fire alarm system shall remain in continuous service throughout the period of construction except with prior written approval of the Architect.
B. During construction, provide heat detectors for all smoke detectors within project scope. Prior to turning project over to owner, reinstall smoke detectors as required.

3.02 WIRING METHODS:

A. Install wiring in accordance with NEC and NFPA 72 requirements. Install wiring concealed above ceilings and in walls. Where run exposed, install wiring in conduit. Conduit shall be painted red where visible.

END OF SECTION

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.

B. Documents: Soil boring locations, findings of subsurface materials, and geotechnical recommendations – herein specified as the Geotechnical Report. Copies of reports available upon request.

1.02 SUMMARY

A. This Section includes the following:
   1. Protecting existing vegetation to remain.
   2. Removing existing trees shrubs groundcovers plants and grass.
   3. Clearing and grubbing.
   4. Stripping and stockpiling topsoil.
   5. Removing above- and below-grade site improvements.
   6. Disconnecting and capping or sealing site utilities.
   7. Temporary erosion and sedimentation control measures.

B. RELATED SECTIONS:
   1. Division 01 Section "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities, and temporary erosion- and sedimentation-control measures.
   2. Division 01 Section "Execution Requirements" for field engineering and surveying.
   3. Division 01 Section(s) "Construction Waste Management and Disposal" for additional requirements of selective disposal.

1.03 MATERIAL OWNERSHIP

A. Except for materials indicated to remain on Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.04 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Use sufficiently detailed photographs or videotape.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.05 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site.

1.06 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify Louisiana One Call (1-800-222-3020) for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.
B. Locate and clearly flag trees and vegetation to remain or to be relocated.
C. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control Drawings and Specification Section 31 10 05.
B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.03 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Division 01 Section "Temporary Tree and Plant Protection."
B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.04 UTILITIES

A. Contact Louisiana One Call (1-800-222-3020) and utility providers marked on ticket.
B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
   1. Arrange with utility companies to shut off indicated utilities.
C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Engineer and Owner not less than three working days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's written permission.
D. Removal of underground utilities is included in Division 2 Sections covering site utilities.

3.05 CLEARING AND GRUBBING

A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.06 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.
B. Strip topsoil to whatever depths are encountered (6” minimum) in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, cinder, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Limit height of topsoil stockpiles to 72 inches.
   2. Do not stockpile topsoil within protection zones.
   3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity which may be reused on the project site.

3.07 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed

3.08 DISPOSAL

A. The User shall have first refusal of salvaged materials.

B. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION

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.

B. Documents: Soil boring locations, findings of subsurface materials, and geotechnical recommendations – herein specified as the Geotechnical Report. Copies of reports available upon request.

C. All references to LADOTD specifications are to the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition unless otherwise noted.

D. All references EBRP DPW specifications are to the East Baton Rouge Parish Standard Specifications for Public Works Construction, latest edition.

1.02 SUMMARY

A. This Section includes the following:
   1. Preparing subgrades for slabs on grade, walks, pavements, turf and grasses.
   2. Base course for concrete walks and pavements.
   3. Subbase course and base course for asphalt paving.
   4. Excavating and backfilling trenches for utilities and pits for buried utility structures, except sanitary sewer.
   5. Erosion-control material(s).

B. Related Sections include the following:
   1. Division 1 Section "Temporary Facilities and Controls.
   2. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
   3. Division 31 Section "Stone Riprap" for stone used for protection and erosion control around the site area.
   4. Division 32 Section "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
   5. Division 33 Section "Storm Drainage" for drainage of site areas.

1.03 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subbase course or subgrade and paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
   2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill Materials: Materials as described in the Products Section of this specification suitable for fill placement as listed below.
   1. Select or Structural Fill: Fill material for all areas other than areas that require fill.
   2. Non-Structural Fill: Fill material as an acceptable alternative for only Select or Structural Fill in areas under pile supported structures with a crawl space (void) beneath the lowest floor.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below pavement, drainage fill, or topsoil materials.
J. Subbase Course: Layer placed between the subgrade and base course for pavement.
K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within pavement area.

1.04 SUBMITTALS
A. Product Data: For each type of the following manufactured products required:
1. Geotextiles.
B. Samples for Verification: For the following products, in sizes indicated below:
1. Geotextile: 12 by 12 inches .
A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for cohesive fill and backfill.
B. Product Certificates: For erosion control blanket from manufacturer.

1.05 QUALITY ASSURANCE
A. Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740, ASTM E 548 and DOTD.

1.06 PROJECT CONDITIONS
A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
1. Do not proceed with work on adjoining property until directed by Architect.
C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
1. Notify Owner’s Representative not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner’s Representative's written permission.
3. Contact utility-locator service for area where Project is located before excavating.
D. Care must be exercised in order not to damage existing structures.
E. Notify Louisiana One Call (1-800-222-3020) for area where Project is located.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS
A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
B. Satisfactory Soils for Select or Structural Fill: Clean, non-expansive fill material, free from debris, roots and organic content. Materials should consist of lean clays (CL) and clayey sand (SC) with a liquid limit less than 45 and a plasticity index between 10 and 25. The material should be classified in accordance with the United Soil Classification System (USCS).
1. As an alternative, structural fill material could consist of “clean” sand or pumped sand having less than 10 percent fines passing the No. 200 Sieve. It should be compacted to at least 95 percent of Maximum Dry Density at Optimum Moisture Content according to ASTM D-698. In-place density measurements should be taken to assure that this degree of compaction is achieved. This material can also be used as pipe bedding material. This material must be certified and approved by the Geotechnical Engineer prior to its use .

2. On-site lean clay (CL) soils may be used as select fill but require bulk testing at time of construction to ensure they meet the parameters of select fill noted above.

C. Base Course (Aggregate): Material required under all future pavements shall be granular, free draining, and compacted over the prepared subbase or subgrade.
   1. Crushed stone (610) aggregate in accordance with the LA DOTD Standard Specifications Sections 302 and 1003.03 (b), 2016 edition.
      a. As an alternative to aggregate base course, Cement Stabilization can be performed to a minimum depth of 12 inches to act as a base course material. A minimum of 9% by volume of cement is recommended to use for soil-cement base course. If fat clays are encountered in the upper two feet, then lime treatment shall be performed at a minimum of 2% by volume to reduce the Plasticity Index between 10 and 25 prior to cement stabilization.

D. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

E. Sandy Backfill: Material required for backfill of trenches beneath roadway pavement or as specified in plans shall be nonplastic siliceous material, graded as follow:

US Sieve	% Passing
1/2“	100
No. 10	75-100
No. 200	0-10

F. Flowable Fill: Non-excavatable material as listed in Table 710-1 of the Louisiana Department of Transportation and Development, Louisiana Standard Specifications for Roads and Bridges, 2016 Edition.

G. Select Granular Filter Material: Conforming to ASTM No. 57 crushed stone aggregate.

2.02 GEOTEXTILES

A. Geotextile fabric shall be Class D in accordance with LA DOTD Standard Specifications Section 1019.01, 2016 edition.

B. Geogrid: Polymer mesh may be used as directed and approved by Geotechnical Engineer to minimize undercutting of unsuitable subgrade material.
   1. Tensar Tri-axial Geogrids or approved equal by Geotechnical Engineer.

2.03 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
   1. Blanket durability: 12 months.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
   1. Remove all shallow surface organic materials consisting of sod, roots, rubble, wood, etc. from beneath the building footprint and proposed pavement areas. This material shall not be used for backfill.

B. Prior to the beginning of construction, the Contractor shall provide erosion control as indicated on the Drawings and in accordance with Section 01 57 23 - “STORMWATER POLLUTION PREVENTION”.

C. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 31 1 000 – “SITE CLEARING."

D. Protect and maintain erosion and sedimentation controls, which are specified in Section 01 57 23 - “STORMWATER POLLUTION PREVENTION”, during earthwork operations.

3.02 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
   2. Contractor shall provide temporary pumping systems to dewater all excavations that become inundated, within 24 hours.
   3. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

C. Correction of damaged soils or constructed site features that are a result of the Contractor's failure to protect the site from temporary drainage conditions shall be performed at no additional cost to the Owner.
   1. The method of soil correction will be determined by the Geotechnical Engineer.

3.03 EXCAVATION, GENERAL

A. Excavation outside the project limits is not allowed under any circumstance.

B. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

C. Excavations at Edges of Tree- and Plant-Protection Zones:
   1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
   2. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.04 EXCAVATION FOR TRENCHES (OTHER THAN SANITARY SEWER)

A. Excavation for Sanitary Sewer Trenches to be in accordance with Section 33 31 00.

B. Excavate trenches to indicated gradients, lines, depths, and elevations.

C. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: 18 inches each side of pipe or conduit.

D. Excavations deeper than 4 feet in depth shall require temporary shoring, bracing, or sheeting in lieu of unsupported slopes

E. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of feature elevation to allow for bedding course.

3.05 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
      a. Bottom of excavation shall be free of all soft, loose or disturbed material and water prior to placement of concrete.
      b. If foundation is not poured the same day the excavation is completed, a thin seal slab of lean concrete shall be placed over the base of the excavation; however, the foundations should not be left open for more than two days. Place a mudmat of lean concrete to seal the bearing stratum of excavations in the event wet conditions are experienced or expected exposure.
   2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
   3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

4. Avoid excavations during inclement weather and place concrete within the excavations within 24 hours after completion of the excavations.

3.06 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.07 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in Section 32 92 00, “Grasses”.

B. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

C. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.08 FLOWABLE FILL

A. Install material in areas indicated and in accordance with the Louisiana Department of Transportation and Development, Louisiana Standard Specifications for Roads and Bridges, 2016 Edition, Section 710, and referenced Sections for Flowable Fill.

3.09 APPROVAL OF SUBGRADE

A. Notify the Geotechnical Engineer when excavations have reached required subgrade.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Geotechnical Engineer.

C. In the presence of the Geotechnical Engineer, proof-roll all building and pavement subgrade areas, plus five feet beyond, a minimum of two complete passes over the entire area with a loaded tandem axle dump truck or other similarly loaded rubber tire vehicle with a minimum weight of 20 tons and a maximum weight of 25 tons to identify soft pockets and areas of excess yielding. Proof-rolling activities shall occur not more than two (2) days prior to commencement of actual paving operations or placement of formwork. Soils which are observed to rut or deflect excessively under the moving load shall be mitigated as determined by the Geotechnical Engineer.
   1. Mitigation may require areas to be undercut and replaced with Satisfactory Soil materials and re-compacted to 95% per ASTM D698;
   2. Or use of Geogrid.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Geotechnical Engineer, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation as directed by the Engineer.

3.11 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
   2. Install silt fencing around perimeter of stockpile for any of the following conditions:
      a. Material is not used in three days or less from placement;
      b. Material runoff drains directly into non-treated drainage system;

3.12 SELECT SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
   1. The first layer of fill should be placed in a relatively uniform horizontal lift and be adequately keyed into the stripped and proof-rolled soils.

B. Place and compact select fill material in layers to required elevations as follows:
   1. Under grass and planted areas.
   2. Under walks and pavements.
   3. Under steps and ramps.
   4. Under building slabs.

5. Under footings and foundations.

C. Place select soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

A. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

B. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that is below optimum moisture content or greater than 3 percentage points above the optimum moisture content value or is too wet to compact to specified dry unit weight.

C. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soils within required range of optimum moisture content value.

D. Compact soil materials to not less than 95 percent of Standard Proctor density as determined by ASTM D 698.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Turf or Unpaved Areas: Plus or minus 1½ inch.
   2. Walks: Plus or minus ½ inch.
   3. Pavements: Plus or minus ¼ inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10-foot straightedge.

3.16 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.17 UTILITY TRENCH BACKFILL (OTHER THAN SANITARY SEWER)

A. Backfill for Sanitary Sewer Trenches to be in accordance with Section 33 31 00.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 32 Section "Cast-in-Place Concrete."

E. Trenches under Roadways: Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 32 Section "Cast-in-Place Concrete."

F. Provide a minimum 6-inch bedding course below the bottom of the pipe. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
G. Backfill voids with satisfactory soil while removing shoring and bracing.
H. Place and compact initial backfill of, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
   1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
I. Place and compact final backfill of satisfactory soil to final subgrade elevation.

3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS
A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
   1. Place base course material over subbase course under hot-mix asphalt pavement.
   2. Shape subbase course and base course to required crown elevations and cross-slope grades.
   3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL
A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and the following special inspections:
   1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
   2. Determine that fill material and maximum lift thickness comply with requirements.
   3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
   4. Establish optimum moisture content and stabilization ratios for subbase.
B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
D. The Contractor shall establish and maintain quality control for construction operations to assure compliance with contract requirements, and maintain records of quality control for all construction operations including but not limited to the following:
   1. Equipment: Type, size, and suitability for construction of the prescribed work.
   2. Foundation Preparation: Breaking surface in advance of construction and during fill placement when necessary, drainage of foundation and partially completed fill.
   3. Materials: Suitability as defined in Section 2.1.
   4. Construction: Layout, maintaining existing drainage, moisture control, thickness of layers, spreading and compacting.
   5. Grade and Cross Section: Crown width, crown slope, side slopes, and grades.
   6. Roads and Ramps: Location of temporary roads, location and placement of fills for ramps in accordance with specified dimensions and grades.
   7. Grade Tolerances: Check fills to determine if placement conforms to prescribed grade and cross section.
   8. Slides: Location and limits; methods and equipment used where remedial work has been directed.
   9. Control Testing.
      a. <u>On-Site Material Testing</u>. The Owner shall perform all control testing such as soil classification, moisture content, control compaction curves, and in-place density for on-site material placement. The testing agency shall perform as a minimum, the specified number of each of the tests to demonstrate to the satisfaction of the

Owner that the specifications are in compliance. Testing shall be performed by a Material Testing Agency, paid by the Owner. Testing agency results shall be reviewed by the Owner's Geotechnical Engineer. Tests performed by the Material Testing Agency shall be furnished to the Owner's Representative and Geotechnical Engineer for review within 24 hours. No additional payment will be made for control testing required in this paragraph. The following tests are required to provide adequate control:

1) In-Place Density Tests. In-place density tests for compacted fill material shall be made in accordance with ASTM D 2922 (Nuclear Method), and shall be made at the following locations and minimum frequencies:
   a) Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than five tests per layer.
   b) Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length, but no fewer than three tests per layer.
   c) Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than three tests per layer.
   d) General Fill: Each lift shall be tested at a frequency of one density test per lift of compacted fill placed in section on a 100 foot grid. The location of the test shall be representative of the area being tested or as directed by the Owner's Representative.
2) Soil Classification Tests. Determination of soil classification shall be in accordance with the Unified Soil Classification System (ASTM D 2487). Atterberg Limits Test required for soil classification shall be performed in accordance with ASTM D 4318 Laboratory Soil Testing.
   a) Each lift shall be tested at a frequency of one soil classification test per 100,000 square feet of compacted fill placed in section. The location of the test shall be representative of the area being tested or as directed by the Owner's Representative.
3) Moisture Content Tests. Determination of moisture content shall be performed in accordance with ASTM D 2216.
4) In addition to the above frequency of tests, additional tests are required as follows:
   a) Where the Owner's Representative has reason to doubt the adequacy of the compaction or moisture control.
   b) Where the Contractor is concentrating fill operations over a relatively small area.
   c) Where special compaction procedures are being used.
   d) When embankment materials change substantially, the Owner's Representative may direct additional testing.
   e) Areas not meeting the specified density shall be retested at no additional cost to the Owner, after corrective measures have been applied.

E. Reporting
   1. The original and two copies of these records of inspections and tests, as well as the records of corrective action taken, shall be furnished to the Owner and Owner's Representative weekly.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

G. Geotechnical Engineer shall inspect subgrade upon completion of embankment.

3.20 FAILURES AND SLIDES

A. Where settlement of the foundation develops to such an extent as to make it inadvisable to continue to add material, the Geotechnical Engineer shall have the right to halt work on that

portion of the embankment or postpone until a later date, considering all attempts to bring that portion of the embankment to full grade and cross section.

B. Should a slide occur in any part of the embankment during its construction, or after its completion, but prior to its acceptance, the Contractor shall, upon written order of the Geotechnical Engineer, either cut out and remove the slide from the embankment and then rebuild that portion of the embankment as the Geotechnical Engineer shall prescribe. In case the slide is caused through fault of the Contractor, the foregoing operations shall be performed at no additional cost to the Owner. In case the slide is not the fault of the Contractor, the repair shall be made by an equitable adjustment under the "CHANGES" clause of the contract. The method of slide correction will be determined by the Geotechnical Engineer.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Curbs.
   2. Pavements.

B. Documents: Soil boring locations, findings of subsurface materials, and geotechnical recommendations – herein specified as the Geotechnical Report. Copies of reports available upon request.

C. All references to LADOTD specifications are to the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition unless otherwise noted.

D. All references EBRP DPW specifications are to the East Baton Rouge Parish Standard Specifications for Public Works Construction, latest edition.

1.02 SUBMITTALS

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

B. Design Mixtures: For each concrete pavement mixture.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

PART 2 - PRODUCTS

2.01 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

D. Plain Steel Wire: ASTM A 82, as drawn.

E. Deformed-Steel Wire: ASTM A 496.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice."

2.02 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
   1. Portland Cement: ASTM C 150, Type I or II.
      a. Fly Ash: Not permitted.

B. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:
   1. Maximum Aggregate Size: 3/4 inches nominal.
   2. Do not use fine or coarse aggregates containing substances that cause spalling.

C. Water: ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: ASTM C 494/C 494M, of type suitable for application, certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.03 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth.

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

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

E. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.04 RELATED MATERIALS

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

ASTM D 1752, cork or self-expanding cork.

B. Cold-Applied Joint Sealants.
   1. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS (to be used at all sloped (greater than 1 on 4) or vertical joint locations).
   2. Type SL Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL (not to be used on sloped (greater than 1 on 4) or vertical joint locations).

C. Joint-Sealant Backer Materials.
   1. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2.05 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:
   1. Compressive Strength (28 Days) as follows uses unless otherwise noted:
      a. 4000 psi.
   2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.53.
   3. Slump Limit: 4 inches, plus or minus 1 inch.
   4. Air Content: 5 percent plus or minus 2 percent.

2.06 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Proof-roll prepared subgrade surface below concrete pavements in accordance with Specification Section 31 20 00.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.03 STEEL REINFORCEMENT

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

3.04 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

C. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.05 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed pavement surfaces with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.06 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.07 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing moisture-retaining-cover curing curing compound or a combination of these methods.

3.08 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. The maximum variations in surface tolerance shall not exceed 1/4 inch in 10 feet.
4. Differences in elevation across an expansion joint shall not exceed 1/32 inch.
    a. High spots shall be ground down, and low spots, cracks and grooves shall be filled in within a minimum 5 feet radius in all directions with a cement based leveling compound underlayment.
    b. Leveling of the concrete slab is the responsibility of the General Contractor or the Concrete Sub-Contractor.
5. Joint Spacing: 3 inches.
6. Contraction Joint Depth: Plus 1/4 inch, no minus.
7. Joint Width: Plus 1/8 inch, no minus.

3.09 FIELD QUALITY CONTROL

A. Testing Agency: Owner to select a qualified independent testing and inspection agency at contractor’s cost to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

B. Testing Services: Testing shall be performed according to the following requirements:

1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yards. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.

7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls 500 psi below specified compressive strength.
    a. Concrete with unsatisfactory strength levels shall either be replaced or core tested per ASTM C 42/C42 M. Additional testing and acceptance shall be in accordance with ACI 301-05 sections 1.6 and 1.7.
    b. Contractor is responsible for all costs of additional testing, evaluation, and replacement of unsatisfactory concrete.

C. Test results shall be reported in writing to Owner, Engineer, Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests

D. Concrete that fails to comply with the testing requirements above will be rejected and areas relative to test samples shall be replaced by the contractor at no additional cost to the owner.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.

C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY
- A. Section includes painted markings applied to asphalt and concrete pavement.
- B. All references to LADOTD specifications are to the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition.
- C. All references EBRP DPW specifications are to the East Baton Rouge Parish Standard Specifications for Public Works Construction, latest edition.

1.02 PREINSTALLATION MEETINGS
- A. Preinstallation Conference: Conduct conference at Project site.

1.03 ACTION SUBMITTALS
- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.01 PAVEMENT-MARKING MATERIALS
- A. Pavement-Marking Paint: Provide materials in accordance with LADOTD Section 1015.12 and referenced section for water-borne traffic paint.
- B. Glass Beads: Provide materials in accordance with LADOTD Section 1015.13 and referenced sections.

PART 3 - EXECUTION

3.01 PAVEMENT MARKING
- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).
  1. Provide two coats for painted striping and pavement markings.
  2. Apply graphic symbols and lettering with paint-resistant, die-cut stencils. Apply paint so that it cannot run beneath the stencil.
  3. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. (0.72 kg/L).
- E. Accessible parking stalls shall include the International Symbol for Accessibility.

3.02 Tolerances and Appearance
- A. In addition to the tolerances and appearance requirements specified in the LADOTD Section 737 and referenced sections, edges shall be uniform with local variations not exceeding 1/8 inch per foot and surfaces shall be smooth and uniform.
- B. Letter sizes and patterns shall be as indicated with variations of not more than plus or minus 15 percent in dimension.

END OF SECTION

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.

B. All references to LADOTD specifications are to the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition unless otherwise noted.

C. All references EBRP DPW specifications are to the East Baton Rouge Parish Standard Specifications for Public Works Construction, latest edition.

1.02 SUMMARY

A. Section Includes items listed below for areas outside of Landscaping limits:
   1. Seeding.
   2. Sod.
   3. Erosion-control material(s).

B. Related Sections:
   1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
   2. Division 31 Section "Earthwork" for excavation, filling and backfilling, and rough grading.

1.03 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.04 SUBMITTALS

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

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

C. Product Certificates: For erosion control blanket from manufacturer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
   1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
   1. Report suitability of topsoil for lawn growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

D. Do not perform seeding when wind exceeds 15 MPH, or when excessively wet or dry.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.07 PROJECT CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.08 MAINTENANCE PERIOD

A. Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
   1. Seeded Lawns: 90 days from Final Acceptance.
      a. When initial maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.
   2. Sodded Lawns: 90 days from Final Acceptance.
      a. When initial maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.01 SEED

A. Use specified seed products as stated on Landscape drawings.
B. If product not specified on Landscape drawings, use the following:
   1. Grass Seed: Fresh, clean, dry, new-crop seed complying with table 717-1 of LADOTD Specification Section 717, 2016 Edition.
   2. Grass Seed Mix: Seed mix based on the planting dates as follows:
      a. March to September: Type A
      b. September to February: Type C
      c. February to March: Type B

2.02 SOD

A. Use specified sod products as stated on Landscape drawings.
B. If product not specified on Landscape drawings, use the following:
   1. Rolls or slabs of field grown Bermuda grass in accordance with LADOTD Specification Section 714, 2016 Edition.

2.03 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.
   1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
      a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.04 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
   2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.05 MULCHES

A. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.06 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
   1. Blanket durability: 12 months.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance.

B. Areas to receive lawns and grass shall include the following:
   1. All disturbed areas not paved.
   2. All disturbed areas not specified for groundcover and plantings by landscape plan.

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

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
   1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
   2. Protect grade stakes set by others until directed to remove them.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.03 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Apply Insert type fertilizer directly to subgrade before loosening.
   2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
      a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   3. Spread planting soil mix to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
      a. Spread approximately 1/2 the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil mix.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, restore areas if eroded or otherwise disturbed after finish grading.

3.04 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Lawn Preparation" Article.

B. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

C. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.05 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
   1. Do not use wet seed or seed that is moldy or otherwise damaged.
   2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 1-2 lb/1000 sq. ft..

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:6 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

3.06 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
   1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
   2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

B. Protect hydro-seeded areas with slopes exceeding 1:6 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

3.07 SOD

A. Install rolls or slabs of field grown Bermuda grass sod in accordance with LADOTD Specification Section 714, 2016 Edition.
   1. Water and establish sod according to LADOTD Specification Section 714.07 and 714.08, 2016 Edition.

3.08 LAWN MAINTENANCE

A. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn. Provide materials and installation the same as those used in the original installation.
   1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

B. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.
   1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Water lawn with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
   1. Mow grass to a height of 1/2 inch or less.

D. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
   1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.

3.09 SATISFACTORY LAWNS

A. Lawn installations shall meet the following criteria as determined by Architect:
   1. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
   2. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Use specified materials to reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.
   1. Lawns damaged by erosion or construction equipment during maintenance period shall be re-sodded to the satisfaction of the Architect.

3.10 CLEANUP AND PROTECTION

A. Promptly remove soil and debris, created by lawn work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after lawn is established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION