Onslow Memorial Hospital
Jacksonville, North Carolina

Second Floor Refurbishment

October 1, 2020

The East Group Project No.: 20190152

CONSTRUCTION DOCUMENTS

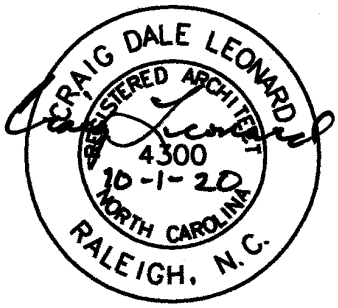
4325 Lake Boone Trail
Suite 311
Raleigh, North Carolina 27607
919-784-9330
252-830-3954 (Fax)

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

4325 Lake Boone Trail
Suite 311
Raleigh, North Carolina 27607
919-784-9330
252-830-3954 (Fax)

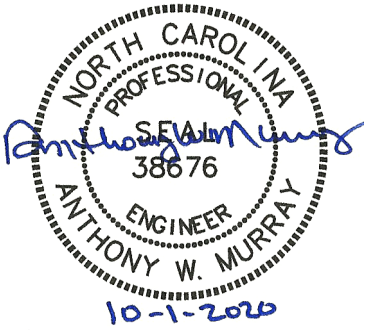
ARCHITECT
The East Group
4325 Lake Boone Trail
Suite 311
Raleigh, North Carolina 27607
Firm Architectural License No. 50213

Name:	Craig Leonard, AIA
Telephone:	919-784-9330
Fax:	252-830-3954
Email:	craig.leonard@eastgroup.com



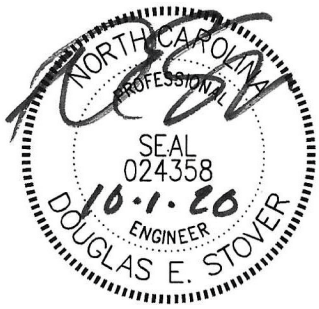
MECHANICAL, FIRE PROTECTION AND PLUMBING ENGINEER
The East Group
4325 Lake Boone Trail
Suite 311
Raleigh, North Carolina 27607
Firm Engineering License No. C-0206

Name:	Anthony Murray, PE
Telephone:	919-784-9330
Fax:	252-830-3954
Email:	anthony.murray@eastgroup.com



ELECTRICAL ENGINEER
The East Group
324 Evans Street
Greenville, NC 27858
Firm Engineering License No. C-0206

Name:	Doug Stover, PE
Telephone:	252-758-3746
Fax:	252-830-3954
Email:	doug.stover@eastgroup.com



ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

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SECTION 00100 - INVITATION TO BID

Sealed proposals will be received on **October 23, 2020 at 2:00 PM** in Onslow Memorial Hospital's Construction & Engineering Office, 215 Station Street, Jacksonville, North Carolina 28546 for furnishing of labor, materials and equipment for the Second Floor Refurbishment project in accordance with the documents prepared by The East Group. Electronic (PDF) proposals may be emailed to Mike Holdren at michael.holdren@onslow.org no later than the date and time noted above. If emailed, original paper copy proposals must be received at the address noted above by **October 28, 2020 4:00 PM.**

An electronic (PDF) copy of proposals shall also be emailed to The East Group to the attention of Shiana Humphrey at shiana.humphrey@eastgroup.com no later than the date and time noted above. An original paper copy of the proposal is not required to be delivered to The East Group.

The bids will be privately opened.

The basis of the contract will be a Single Prime General Contract.

A mandatory Pre-Bid walk-through will be held at October 13, 2020 **at 10:00 AM**. All bidders are required to attend this walk-through and are requested to meet Mr. Holdren in the Main Lobby of the hospital.

A Bid Bond in the amount of 5% of the base bid will be required with each bid.

Bids shall include provisions for infection prevention as specified in 01550 Infection Prevention.

The Owner reserves the right to reject any or all bids and to waive informalities.

END OF SECTION 00100

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

INSTRUCTIONS TO BIDDERS

for the following PROJECT:
(Name and location or address):

Second Floor Refurbishment
Onslow Memorial Hospital
317 Western Boulevard
Jacksonville, North Carolina 28546

THE OWNER:
(Name, legal status and address):
Onslow Memorial Hospital
317 Western Boulevard
Jacksonville, North Carolina 28546

THE ARCHITECT:
(Name, legal status and address):
The East Group, P.A.
4325 Lake Boone Trail
Suite 311
Raleigh, NC 27607

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INSTRUCTIONS TO BIDDERS

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Special Instructions to Bidders – Onslow Memorial Hospital Minority and/or Women Business Enterprise (M/WBE) Program- Bidding Procedures, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, Specification Section 00797, or in other Contract Documents are applicable to the Bidding Documents.

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

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

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

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 The Bidder by making a Bid represents that:
§ 2.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

§ 2.1.2 The Bid is made in compliance with the Bidding Documents.

§ 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

§ 2.1.5 The Bidder is a Contractor licensed to do business in the state of North Carolina and whose license number appears in the space provided on the Form of Proposal.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 COPIES

§ 3.1.1 Bidders will be provided one copy of reproducible Contract Documents.

§ 3.1.2 Bidding Documents will not be issued directly to Sub-bidders.

§ 3.1.3 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

§ 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

§ 3.2.2 Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least seven days prior to the date for receipt of Bids.

§ 3.2.2.1 Document Clarification Form located in Section 00215 are to be submitted to the Architect.

§ 3.2.3 Interpretations, corrections and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

§ 3.3 SUBSTITUTIONS

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

§ 3.3.2 No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final. It shall not be incumbent upon the Owner and/or the Architect to consider any items submitted for substitution but only those, in their judgment, meriting consideration. All requests for substitution by Sub-bidders or Material Suppliers will be considered only when made and approved through a qualified Bidder and when submitted with sufficient information to evaluate the product/materials being submitted. All requests shall comply with the following:

1. The equipment and/or product submitted must be equal in all ways to the specified equipment or product. The Architect will make the final decision.
2. The proposer of the substitution of equipment or product shall identify any delay to the schedule for work, inspections, or tests which might result from the use of the proposed substitution.

The proposer of the substitution of equipment or product shall identify any delay to the schedule for work, inspections, or tests which might result from the use of the proposed substitution.

§ 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

§ 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents. The Owner and the Architect will consider a formal request for substitution, as indicated in Section 01631 - Product Substitutions of products in place of those specified prior to the signing of the Owner/Contractor Agreement only. No substitutions unless otherwise noted will be allowed after the Contract has been signed.

§ 3.3.5 Time limits in Subparagraph 3.3.2 for substitutions shall be based on the original receipt of Bids date as established in the Invitation To Bid or the Advertisement For Bid.

§ 3.4 ADDENDA

§ 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 PREPARATION OF BIDS

§ 4.1.1 Bids shall be submitted on the forms included with the Bidding Documents. The Form of Proposal included in the Project Manual is for reference only and shall not be removed but it may be reproduced by the Bidder.

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

§ 4.1.3 Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.

§ 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid.

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

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

§ 4.1.8 The Contractor shall provide the names of Subcontractors, persons, or entities (including those who are to furnish materials and/or equipment fabricated) proposed for all portions of the Work as indicated on the Bid form.

Failure to include said list will cause said bid to be non-responsive which may result in rejection of said bid by the Owner.

§ 4.2 BID SECURITY

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

§ 4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

§ 4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

§ 4.2.4 Bids shall be accompanied by a cash-deposit or a certified check drawn on and certified by a bank or trust company insured by the Federal Deposit Insurance Corporation, in an amount not less than 5 percent of the bid, or in lieu thereof, a bidder may offer a bid bond in the amount of 5 percent of the bid executed by a corporate surety licensed under the laws of the state in which the project is located to execute such bond and listed on the latest U.S. Treasury Department list of companies holding certificates of authority as acceptable sureties on Federal Bonds. Form of bond shall be AIA Document A310. Should the bidder fail or refuse to enter into a Contract with the Owner within ten calendar days of receipt of the Contract for signature, or should the Bidder fail or refuse to furnish the Performance and Labor and Material Payment Bonds AIA Document A312, then the bid security shall be forfeited to the Owner.

§ 4.2.5 Certified checks and/or Bid Bonds shall be pinned or clipped to the Proposal Form.

§ 4.3 SUBMISSION OF BIDS

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

Proposals shall be received by the specified time to the place indicated herein by a representative of the Bidder. The outside of the envelope shall be as indicated below:

Onslow Memorial Hospital
Construction & Engineering Office
215 Station Street
Jacksonville, North Carolina 28546

PROPOSAL FOR: **ONSLOW MEMORIAL HOSPITAL – SECOND FLOOR REFURBISHMENT**

§ 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

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

§ 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

§ 4.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid. No bid may be withdrawn after the scheduled closing time for receipt of bids for a period of ninety (90) days.

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid. Proposals may be modified by an authorized representative of the bidder IN PERSON AT PLACE OF BID OPENING PRIOR TO TIME OF OPENING BIDS ONLY. Modifications submitted by any other means WILL NOT BE CONSIDERED.

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

§ 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS
All Bids will be privately opened.

§ 5.2 REJECTION OF BIDS
The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

§ 5.3 ACCEPTANCE OF BID (AWARD)
§ 5.3.1 It is the intention of the Owner to award the contract to the responsive and responsible bidder submitting the proposal most favorable to the Owner and whose construction skill and financial resources are fully equal to the task of prosecuting the work in a rapid and satisfactory manner, and of completing the work within the time limit.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the contract award.

§ 5.3.3 Bidders shall be required to have successfully completed projects of a similar scope and complexity. If requested by the Owner, Bidders shall submit the names and phone numbers of the Owner's representatives for these projects.

If any Bidders cannot furnish information verifying that he has the required experience then his Bid shall be considered as non responsive and therefore rejected.

The Bidder shall submit the name of the superintendents (office manager and project manager) that will be assigned to the project.

ARTICLE 6 POST-BID INFORMATION
§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT
Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

§ 6.2 SUBMITTALS
§ 6.2.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

- **.1** a designation of the Work to be performed with the Bidder's own forces;
- **.2** names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and
- **.3** names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.
- **.4** provide documentation in accordance with specification section 00102 “Special Instructions to Bidders – Onslow Memorial Hospital Minority and/or Women Business Enterprise (M/WBE) Program- Bidding Procedures”; documentation shall include (1) affidavit C or affidavit D (2) letters of intent.

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

§ 6.2.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 BOND REQUIREMENTS

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources. A Performance Bond and Labor and Material Payment Bond shall be required of the Contractor by the Owner in the full amount of the Contract price. Form of required Bonds shall be AIA Document 312. No other forms of Performance and/or Payment Bond will be accepted

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

§ 7.1.3 If the Owner requires that bonds be secured from other than the Bidder's usual sources, changes in cost will be adjusted as provided in the Contract Documents.

§ 7.2 TIME OF DELIVERY AND FORM OF BONDS

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner with the executed Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

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

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

ARTICLE 8 TAXES

§ 8.1 Each party shall be responsible for payment of any and all federal, state, local or other taxes which may arise or be imposed as the result of its performance under this Agreement or as the result of the receipt of any compensation or other funds under this Agreement or in connection with the transactions contemplated hereby, if any. This Section shall survive termination of this Agreement.

ARTICLE 9 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

END OF SECTION 00101

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

Special Instructions to Bidders

Onslow Memorial Hospital
Minority and/or Women Business Enterprise (M/WBE) Program

Onslow Memorial Hospital
Construction Guidelines and Affidavits
$100,000 and above

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

These instructions shall be included with each bid solicitation.

Onslow Memorial Hospital
Minority and/or Women Business Enterprise Program

$100,000 and Construction Guidelines for M/WBE Participants

Policy Statement
It is the policy of Onslow Memorial Hospital to provide minorities and women equal opportunity for participating in all aspects of the System's construction contracting.

Goals and Good Faith Efforts
Bidders responding to this solicitation shall comply with the M/WBE program by making Good Faith Efforts to achieve the following aspiration goals for participation.

	MBE	WBE
Construction This goal includes Construction Manager at Risk.	7%	4%

Bidders shall submit M/WBE information with their bids on the forms provided. This information will be subject to verification by Onslow Memorial Hospital prior to contract award. Contractors, subcontractors, suppliers, service providers, or M/WBE members of joint ventures intended to satisfy Onslow Memorial Hospital's M/WBE goals shall be certified by the NC Office of Historically Underutilized Businesses (NC HUB) only. Firms qualifying as "WBE" for Onslow Memorial Hospital's goals must be designated as a "woman-owned business" by the HUB Office. Firms qualifying as "MBE" for the Onslow Memorial Hospital's goals must be certified in one of the other categories (i.e.: Black, Hispanic, Asian American, American Indian, Disabled, or Socially and Economically Disadvantaged). Those firms who are certified as both a "WBE" and "MBE" may only satisfy one requirement. A complete database of NC HUB certified firms may be found at http://www.doa.nc.gov/hub/.

Please note: A contractor may utilize any firm desired. However, for participation purposes, all M/WBE vendors who wish to do business *as a minority* must be certified by NC HUB.

The Bidder shall make good faith efforts to encourage participation of M/WBEs prior to submission of bids in order to be considered as a responsive bidder. Bidders are cautioned that even though their submittal indicates they will meet the M/WBE goal, they should document their good faith efforts and be prepared to submit this information if requested.

The M/WBE's listed by the Contractor on the Identification of Minority/Women Business Participation shall perform the work and supply the materials for which they are listed unless the Contractors receive prior authorization from the Onslow Memorial Hospital to perform the work with other forces or to obtain materials from other sources.

The Contractor shall enter into and supply copies of fully executed subcontracts with each M/WBE or supply signed Letter(s) of Intent to the Project Manager after award of contract and prior to Notice to Proceed. Any amendments to subcontracts shall be submitted to the Project Manager prior to execution.

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

Instructions

The Bidder shall provide with the bid the following documentation:

☐ Identification of Minority/Women Business Participation
☐ Affidavit A (if subcontracting)

OR

☐ Identification of Minority/Women Business Participation
☐ Affidavit B (if self-performing; must attest that bidder does not customarily subcontract work on this type of project—includes supplies and materials)

Within 72 hours or 3 business days after notification of being the apparent low bidder who is subcontracting anything must provide the following information

☐ Affidavit C (if aspirational goals are met or are exceeded)

OR

☐ Affidavit D (if aspirational goals are not met)

After award of contract and prior to issuance of notice to proceed

☐ Letter(s) of Intent

****With each pay request, the contractors will submit the Proof of Payment Certification, listing payments made to all subcontractors.**

*****If a change is needed in M/WBE Participation, submit a Request to Change M/WBE Participation Form. Good Faith Efforts to substitute with another M/WBE contractor must be demonstrated.**

Minimum Compliance Requirements:

All written statements, affidavits, or intentions made by the Bidder shall become a part of the agreement between the Contractor and Onslow Memorial Hospital for performance of contracts. Failure to comply with any of these statements, affidavits or intentions or with the minority business guidelines shall constitute a breach of the contract. A finding by Onslow Memorial Hospital that any information submitted (either prior to award of the contract or during the performance of the contract) is inaccurate, false, or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract. It shall be solely at the option of Onslow Memorial Hospital whether to terminate the contract for breach or not.

In determining whether a contractor has made Good Faith Efforts, Onslow Memorial Hospital will evaluate all efforts made by the Contractor and will determine compliance in regard to quantity, intensity, and results of these efforts.

DOC #586829

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

Identification of Minority/Women Business Participation

I,_____,
(Name of Bidder)

do hereby certify that on this project, we will use the following minority/women business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work type	*M/WBE Category

*M/WBE categories: Black, African American (**B**), Hispanic, Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

The total value of M/WBE business contracting will be ($)_____

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

ONSLOW MEMORIAL HOSPITAL
AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

(Name of Bidder)

Affidavit of_____

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- ❑ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ❑ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ❑ **3** – **(15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ❑ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ❑ **5** – **(10 pts)** Attended prebid meetings scheduled by the public owner.
- ❑ **6** – **(20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ❑ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ❑ **8** – **(25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ❑ **9** – **(20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ❑ **10** - **(20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority/Women Business Participation schedule conditional upon scope of contract to be executed with the Owner.

The undersigned hereby certifies that he or she has read the terms of the minority/women business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of_____, County of_____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

ONSLOW MEMORIAL HOSPITAL
AFFIDAVIT B – Intent to Perform
Contract with Own Workforce

County of _____

Affidavit of_____
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the _____

_____contract.
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date:_____Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of_____, County of_____
Subscribed and sworn to before me this _____day of _____20_____
Notary Public_____
My commission expires _____

ONSLOW MEMORIAL HOSPITAL

AFFIDAVIT C – Portion of the Work to be Performed by M/WBE Firms

County of _____
(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by M/WBE businesses is equal to or greater than 11% of the bidders total contract price, then the bidder must complete this affidavit. This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of _____I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with minority/women business enterprises. Minority/women businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required.)

Name and Phone Number	*M/WBE Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

The undersigned will enter into a formal agreement with M/WBE Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of _____, County of _____

Subscribed and sworn to before me this _____day of _____20_____

Notary Public_____

My commission expires_____

ONSLOW MEMORIAL HOSPITAL
AFFIDAVIT D – Good Faith Efforts

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 11% participation by minority/women business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of _____I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with minority/women business enterprises. Minority/women businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required.)

Name and Phone Number	*M/WBE Category	Work description	Dollar Value

***Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**),Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

Examples of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.

E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.

F. Copy of pre-bid roster.

G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.

H. Letter detailing reasons for rejection of minority business due to lack of qualification.

I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

The undersigned will enter into a formal agreement with M/WBE Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of_____, County of _____
Subscribed and sworn to before me this _____day of _____20_____
Notary Public_____
My commission expires _____

LETTER OF INTENT
M/WBE Subcontractor Performance

Please submit this form <u>or</u> executed subcontracts with M/WBE firms after award of contract and prior to issuance of notice to proceed.

PROJECT: _____
(Project Name)

TO: _____
(Name of Prime Bidder/Architect)

The undersigned intends to perform work in connection with the above project as a:

____Minority Business Enterprise _____Women Business Enterprise

The M/WBE status of the undersigned is certified the NC Office of Historically Underutilized Businesses (required). ___ Yes ___ No

The undersigned is prepared to perform the following described work or provide materials or services in connection with the above project at the following dollar amount:

Work/Materials/Service Provided	Dollar Amount of Contract	Projected Start Date	Projected End Date

_____
(Date)

_____ _____
(Address) (Name & Phone No. of M/WBE Firm)

_____ _____
(Name & Title of Authorized Representative of M/WBE) (Signature of Authorized Representative of M/WBE)

REQUEST TO CHANGE M/WBE PARTICIPATION

(Submit changes only if notified as apparent lowest bidder, continuing through project completion)

Project: _____

Bidder or Prime Contractor: _____

Name & Title of Authorized Representative: _____

Address: _____ **Phone #:** _____

_____ **Email Address:** _____

Total Contract Amount (including approved change orders or amendments): $_____

Name of subcontractor: _____

Good or service provided: _____

Proposed Action:

___Replace subcontractor
___Perform work with own forces

For the above actions, you must provide one of the following reasons (Please check applicable reason):

___ The listed MBE/WBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract.

___The listed MBE/WBE is bankrupt or insolvent.

___The listed MBE/WBE fails or refuses to perform his/her subcontract or furnish the listed materials.

___The work performed by the listed subcontractor is unsatisfactory according to industry standards and is not in accordance with the plans and specifications; or the subcontractor is substantially delaying or disrupting the progress of the work.

If replacing subcontractor:

Name of replacement subcontractor: _____

The M/WBE status of the contractor is certified by the NC Office of Historically Underutilized Businesses (required). ___Yes ___No

Dollar amount of original contract $_____

Dollar amount of amended contract $ _____

Do not submit with bid Do not submit with bid Do not submit with bid Do not submit with bid

Other Proposed Action:

___Increase total dollar amount of work ___Add additional subcontractor
___Decrease total dollar amount of work ___Other

Please describe reason for requested action: _____

_____

If adding additional subcontractor:*

The M/WBE status of the contractor is certified by the NC Office of Historically Underutilized Businesses (required).___Yes ___No

**Please attach Letter of Intent or executed contract document*

Dollar amount of original contract $_____

Dollar amount of amended contract $ _____

Interoffice Use Only:

Approval __Y __N

Date_____

Signature_____

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

Do not submit with bid Do not submit with bid Do not submit with bid Do not submit with bid

Pay Application No. _____

Purchase Order No. _____

Proof of Payment Certification

M/WBE Contractors, Suppliers, Service Providers

Project Name: _____

Prime Contractor: _____

Current Contract Amount (including change orders): $_____

Requested Payment Amount for this Period: $_____

Is this the final payment? ___Yes ___No

Firm Name	M/WBE Category*	Total Amount Paid from this Pay Request	Total Contract Amount	Total Amount Remaining

*Minority categories: Black, African American (**B**), Hispanic or Latino (**L**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**S**) Disabled (**D**)

Date:_____

Certified By: _____
Name

_____
Title

_____
Signature

SECTION 00215 - DOCUMENT CLARIFICATION REQUEST (DCR)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Specified This Section:

1. This Section specifies administrative and procedural requirements for disposition of Document Clarification Request (DCRs) during the Bidding Phase.

1.2 SUBMITTALS

A. Submit each request (DCR) on the form included this in section.

B. Provide only one request on each form.

C. Email DCR form to The East Group.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 CONDITIONS:

A. Submit requests to the Architect as soon as possible.

B. DCRs will be received up to seven (7) calendar days prior to the Bid date. DCRs received after that date will not be reviewed.

3.2 ARCHITECT'S ACTION:

A. The Architect will review the information requested.

1. If, after researching the issue, if the information is found within the Contract Documents, then no formal response will be forth coming.

B. The Architect’s response will be in the space provided on the DCR form included this in section.

00215 – DOCUMENT CLARIFICATION REQUEST (DCR)

DOCUMENT CLARIFICATION REQUEST	**Date**:
Attention:	Submitted By:
The East Group 4325 Lake Boone Trail, #311 Raleigh, NC 27607	

Subject:

Specification Number:

Drawing Sheet Number:

INFORMATION REQUESTED

Signed: _____

RESPONSE

- ❑ See Drawings/Specifications_____
- ❑ See Addenda to be issued
- ❑ Other

Answered By: _____ Date: _____

END OF DOCUMENT 00215

SECTION 00231 - PRODUCT SUBSTITUTIONS DURING BID

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Specified This Section:

1. This Section specifies administrative and procedural requirements for submitting requests for substitutions prior to Bid.

1.2 SUBMITTALS

A. Substitution Request Submittal:

1. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
2. Provide complete documentation showing compliance with the requirements for substitutions, and the following information:
   a) Original copies of Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
   b) Samples.
   c) A detailed point by point comparison of the proposed substitution and the specified product detailing the significant qualities of both products. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
   d) Ensure the product fits in the designated space.
   e) The manufacturer or fabricator shall certify or guarantee the specified product as required by the Documents.
   f) The substitution is in compliance with applicable code requirements.
   g) Coordination information:
      1) Including a list of changes or modifications required to other parts of the Work and to construction performed by the Owner and separate Contractors, which will become necessary to accommodate the proposed substitution.
   h) Certification by the Bidder that the substitution proposed is equal-to or better in every significant respect to that required by the Documents, and that it will perform adequately in the application indicated.

B. Architect's Action:

1. After receipt of the request for substitution, the Architect may request additional information or documentation for evaluation.
2. If a proposed substitute is accepted, it will be indicated in an upcoming Addendum.
3. Architect’s decision is final and such reasons, if not approved, will not be furnished.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 00231

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

FORM OF SINGLE PRIME CONTRACT PROPOSAL

PROPOSAL SUBMITTED BY _____

ADDRESS _____

_____

TELEPHONE NO. (_____)_____

LICENSE NO. _____

BIDDING AS: **GENERAL CONTRACTOR**

TO: O**nslow Memorial Hospital**
Construction & Engineering Office
215 Station Street
Jacksonville, North Carolina 28546

The Undersigned, having examined, compared, and familiarized himself with the Invitation to Bid, the Instructions to Bidders, Special Instructions to Bidders (M/WBE) program, and the Contract Documents as prepared by The East Group, and having examined the site of the Work and familiarized himself with all conditions and requirements pertaining thereto, hereby proposes to furnish all material, labor, equipment, services, and transportation necessary to complete the work in accordance with the Contract Documents for the Project entitled:

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

for the sum(s) of:

BASE BID: GENERAL CONTRACT – (Including Allowances – Section 01210)

_____

_____Dollars ($_____).

The undersigned further proposes to undertake work on the Date of Commencement as established in the Agreement and shall achieve Substantial Completion of the entire Work within not more than _____ calendar days. Contractor shall provide a project construction schedule with the bid proposal.

For each day in excess thereof, liquidated damages shall be as stated in the Contract Documents.

Which may be adjusted by the owner's acceptance of any or all of the below listed alternate proposals:

Alternate No. 1: Replace lighting at the nurses' station as identified and described in the Contract Documents – See Section 01230 – Alternates (ADD).

_____

_____Dollars ($_____).

Net effect on project completion time (add/deduct) _____ calendar days. For each day in excess thereof, liquidated damages shall be as stated in the Contract Documents.

UNIT PRICES:

Provide the following unit prices. Express in words and figures. In case of discrepancy, amount shown in words shall govern. See Division 1, Section 01026 – Unit Prices:

Unit Price No. 1: Additive cost for contractor's on-site General Conditions, overhead plus profit, per day for stop work notice issued by Owner for a duration greater than 4 hours:

The sum of_____Dollars per day ($_____).

The Owner's Independent Testing Laboratory (ITL) shall be sole judge as to the classification of work being performed under the unit prices listed above.

The undersigned confirms that he has attached the specified bid security and that in the event should he fail or refuse to enter into a contract with the Owner, such bid security will be forfeited to the Owner as liquidated damages.

The undersigned acknowledges that he has received and reviewed the below enumerated addenda and has taken them into account in the preparation of this proposal.

Addendum No._____ dated _____.

Addendum No._____ dated _____.

Addendum No._____ dated _____.

Respectfully submitted this _____ day of _____, _____ without conditions by:

_____
(Name of Firm or Corporation making bid)

_____
By:

_____
Title: (Owner, Partner, or Corp. Pres. or Vice-Pres. Only).

WITNESS:

_____
(Proprietorship or Partnership)

ATTEST:

_____
By:

_____
Title:

(CORPORATE SEAL)

For All Official Notices

_____
Name and Title

_____
Name of Firm/Corporation

_____
Street Address

_____
City, State and Zip

_____
Area Code and Telephone

_____
Bonding Company Attorney-In-Fact Manager

_____
Area Code and Telephone

PRINCIPAL SUB-BIDDERS:

The General Contractor states that his bid is based on quotations received from the following subcontractors for the categories of work listed; he further agrees that if he is the successful Bidder and if the listed subcontractors are approved by the Architect, he shall contract with the listed subcontractors for the performance of this work:

SPRINKLER SUB-CONTRACTOR

Firm Name:_____

_____Dollars ($_____)

PLUMBING SUB-CONTRACTOR

Firm Name:_____

_____Dollars ($_____)

MECHANICAL (HVAC) SUB-CONTRACTOR

Firm Name:_____

_____Dollars ($_____)

ELECTRICAL SUBCONTRACTOR

Firm Name:_____

_____Dollars ($_____)

PRINCIPAL STAFF:

The General Contractor states that his bid is based the following principal staff that will be assigned for the duration of the project:

_____
Superintendent

_____
Office Manager

_____
Project Manager

ONSLOW MEMORIAL HOSPITAL MINORITY AND/OR WOMEN BUSINESS ENTERPRISE (M/WBE) PROGRAM:

The General Contractor states that his bid includes the following documentation based on the requirements of Specification Section 00102 "Special Instructions to Bidders – Onslow Memorial Hospital Minority and/or Women Business Enterprise (M/WBE) Program- Bidding Procedures".

Documents Included in Bid:

1. Identification of Minority/Women Business Participation form.
2. Affidavit A (if subcontracting)
   OR
3. Affidavit B (if self-performing)

END OF SECTION 00400

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§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Project Manual, Pre-Bid Meeting Minutes, Specifications, Addenda issued prior to execution of the Contract, any other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order or a Change Proposal Request, (3) a Construction Change Directive or (4) a clarification, interpretation or a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.1.1 THE CONTRACTOR'S BID SHALL BE PART OF THE CONTRACT DOCUMENTS.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect and Owner shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Owner's and Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project. Work includes providing supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, complete and functional installation even though not indicated in the Contract Documents

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, diagrams., and notes, etc. Mechanical, Plumbing, and Electrical Drawings are diagrammatic only. Actual work shall be installed consistent with measurements obtained at the job-site, shall be coordinated with other trades as necessary, and shall be consistent with shop drawings, coordination drawings and manufacturer's published requirements.

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 THE PROJECT MANUAL

The Project Manual is a volume assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

§ 1.1.8 FURNISH:
Unless specifically limited in context, the word "furnish" and any derivatives thereof, mean; furnishing to Project site items specified, materials, equipment apparatus, appurtenances, and all items necessary.

§ 1.1.9 INSTALL:
The word "install" and any derivatives thereof mean; incorporating in the Work including all necessary labor, materials, and connections to perform and properly complete in place, ready for operation or use, including unpacking and assembly if necessary.

§ 1.1.10 PROVIDE:
The word "provide" and any derivatives thereof mean; furnish and install as defined above.

§ 1.1.11 THE CONTRACTOR SHALL:
In interest of conciseness, sentences, statements, and clauses used may exclude any form of verb "shall" normally expressed in verb phrase with verbs such as "furnish", "install", "provide", "perform", "construct", "erect", "comply", "apply", "submit", etc. Any such sentences, statements, and clauses are to be Interpreted to include applicable form of phrase "the Contractor shall" and requirements described therein interpreted as mandatory elements of Contract.

§ 1.1.12 EVALUATION:
The word "evaluation" and any derivative thereof, as used in reference to Architect mean; to become generally familiar with the progress and quality of the portion of Work completed to determine in general if it is being performed in a manner indicating that the Work when completed may be occupied or utilized by the Owner for its intended use.

§ 1.1.13 INSPECT:
The word "inspect" and any derivative thereof, as used in reference to the Architect shall mean the type of evaluation that a reasonably prudent architect exercising ordinary professional skill and care on similar Projects would make to determine if the Work is in general accordance with the Contract Documents.

§ 1.1.14 SEE:
In interest of conciseness, references to specification sections and details are preceded by the word "see". Any such references are to be interpreted to include applicable form of phrase ", and comply with".

§ 1.1.15 INDICATED and SHOWN:
The word "indicated" or "shown" and any derivative thereof shall mean as detailed, scheduled, schematically depicted or stated in Contract Documents.

§ 1.1.16 INSTRUMENTS OF SERVICE
Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.17 INITIAL DECISION MAKER
The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 4.3 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them. All work shall conform to the Contract Documents. No change there from shall be made without prior written authorization by the Owner. Where only part of the Work is indicated, similar parts shall be considered

repetition. When any detail is shown and the components therefore are fully described, similar details shall be construed to require the same materials and construction. Whenever there are discrepancies between Drawings, or between the Drawings and Specifications, or conflicts within the Specifications, the Contractor shall furnish and install the better quality or greater quantity unless otherwise ordered in writing. Items required by either the Drawings or the Specifications and not mentioned in the other shall be of like effect as if shown or mentioned in both. Should the Specifications and Drawings fail to particularly describe a product or material shown to be used in any place, subject to the Architect's approval, the Contractor shall furnish the product that would normally be used in this place to produce first quality finished work.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed, nor to limit the scope of work performed by any trade or by any Subcontractor or supplier, unless the Work is indicated in the Instructions to Bidders to be accomplished under two or more prime contracts in lieu of a single prime contract. Such separations shall not operate to make the Architect an arbiter to establish limits of work between Subcontractors or between Contractor and Subcontractor.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 General Conditions of the Contract, and General Requirements apply to all specifications.

§ 1.2.5 References to "match existing" in Contract Documents refer to existing finishes, materials and qualities which have been used in adjacent portions of existing facilities.

§ 1.2.6 Material designations or details not specifically shown shall either match existing or be similar in finish, material or quality to similar adjacent conditions.

§ 1.2.7 Any inconsistency in the Contract Documents shall be resolved by giving precedence in the following order: (A) the Owner/Contractor Agreement, (B) the General Conditions, (C) Division 1 General Requirements, (D) the Drawings and Technical Specifications, and (E) the Bidding Documents consisting of the Notice to Bidders and Instructions to Bidders.

§ 1.2.8 Where items are specified by the use of a reference standard, the date of the reference standard shall be the latest edition published on the date the Agreement is executed unless a specific edition is referenced in the Specifications or in an applicable code, in which case the specific referenced edition shall govern.

§ 1.2.9 Materials which are shown on the drawings and which may not be specifically described in the Specifications or on the Drawings shall be furnished by the Contractor, shall be suitable for the intended use, and shall be subject to review for conformance with the intent of the Contract Documents. Where installation techniques are not specified, they shall be in accordance with the manufacturer's current instructions and industry standards.

§ 1.3 CAPITALIZATION
Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

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

§1.5 EXECUTION OF CONTRACT DOCUMENTS

§1.5.1 The Contract Documents shall include and be enumerated on in or on attachment(s) to the Agreement, and any attachment(s) shall be signed by the Owner and Contractor.

§1.5.2 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§1.5.3 By executing the Contract, the Contractor represents he has reviewed all Contract Documents and the cost of all materials and equipment shown or indicated in the Contract Documents have been included in the Contract Sum and that all costs for materials and labor associated with the installation of such equipment have been included in the Contract Sum.

§1.6 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.6.1 The Drawings, Specifications and other documents, including those in electronic form, prepared by the Architect and/or the Architect's consultants are Instruments of Service through which the Work to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect or the Architect's consultants, and unless otherwise indicated and any rights of the Owner, the Architect and/or the Architect's consultants shall be deemed the authors of them and will retain all common law, statutory and other reserved rights, in addition to the copyrights. All copies of Instruments of Service, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request of the Owner or Architect, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other Projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and/or the Architect's consultants. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and/or the Architect's consultants appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect and/or the Architect's consultants. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' copyrights or other reserved rights.

§ 1.6.1.1 If required to be furnished or if furnished, Architect or Architect’s Consultants shall furnish electronic data in software format in use by Architect at the time Architect’s services are performed. Contractor, any Subcontractors or Sub-subcontractors, material or equipment suppliers, or others shall be responsible for proper storage, maintenance and conversions necessary to prevent degradation or obsolescence of data. Any change or modification in electronic data by Contractor, any Subcontractors or Sub-subcontractors, material or equipment suppliers, or others shall be at their sole risk and without liability or legal exposure to Architect, Architect’s consultants or Owner, and to fullest extent permitted by law, the Contractor, any Subcontractors or Sub-subcontractors, material or equipment suppliers agrees to hold harmless and indemnify Architect, Architect’s consultants and Owner from and against all claims, liabilities, losses, damages, and costs, including but not limited to reasonable attorney’s fees, arising there from or in connection therewith.

§ 1.6.1.2 The Contractor, any Subcontractors or Sub-subcontractors, material or equipment suppliers, and others understands that the conversion of electronic information and data supplied by the Architect or Architect’s consultants from the system and format used by the Architect or Architect’s consultants to an alternative or upgraded system or format, whether performed by Architect, Architect’s consultants or others, cannot be accomplished without the introduction of inexactitudes, anomalies, omissions and errors.

In consideration of the Architect's agreement to deliver electronic data, the Contractor, any Subcontractors or Sub-subcontractors, material or equipment suppliers, and others agrees to hold Architect, Architect's consultants and Owner harmless and to waive any and all claims, liabilities, losses, damages, and costs arising out of or in any way connected with the conversion of electronic data supplied by the Architect or Architect's consultants.

§ 1.6.1.3 If documents, including those in electronic form, are modified, revised or changes in any way by the Contractor, Subcontractor, Sub-subcontractor, and material and equipment supplier, or others, any reference to the Architect and Architect's consultant, and any professional seals and signatures shall be removed from the documents.

§ 1.6.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other Projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.7 TRANSMISSION OF DATA IN DIGITAL FORM
If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER
§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner may designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.1.1 Owner as referred to in these documents is: Onslow Memorial Hospital, Jacksonville, NC.

§ 2.1.2 The Owner shall furnish to the Contractor within thirty days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.1.3 Provided however, if required by the Owner's title insurer, lender or in connection with bond indebtedness, the Contractor shall execute a subordination agreement in form and substance satisfactory to such entities.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER
§ 2.2.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.2 The Owner shall furnish surveys describing physical characteristics, legal limitations and known utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work. The Contractor shall be responsible for verification of exact utility locations. The accuracy of grades, elevations, dimensions or locations of existing conditions is not guaranteed by the Architect or Owner, and the Contractor is responsible for verifying such items.

§ 2.2.3 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness, and complete and accurate to the best of the Owner's information and belief. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.4 Contractor will be furnished, free of charge, one set of reproducible Drawings and one copy of the Project Manual which the Contractor may use for the limited purpose of making copies thereof required for use in performance of Work, in accordance with Paragraph 1.6.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK
If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK
If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order or Construction Change Directive, shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

§ 2.4.1 Neither Owner nor its officers, agents, or employees are in any way liable or accountable to Contractor or its Surety, if any, for method by which completion of said work, or any portion thereof, is accomplished or for price paid therefore, unless Surety is required to pay cost to complete the Project, in excess of the amount contained in the Owner-Contractor Agreement, as a direct result of the Architect's negligent issuance of Certificate(s) for Payment. Contractor and Surety are responsible for all costs for completing the work including cost in excess of original contract price. Owner does not forfeit right to recover damages from Contractor or Surety for failure to complete contract by taking over the work or by declaring contract in default. Maintenance of the work remains Contractor's and Surety's responsibility as provided for in Performance Bond and guarantee of Contractor.

§ 2.4.2 The Owner reserves the right but not the obligation, to perform any work on the site, whether within or without the scope of the Contract, necessary to correct any conditions which at the sole discretion of the Owner pose a hazard to the health or safety of employees, visitors, or the general public. Such work will only be done on an emergency basis. If practical under the circumstances, the Contractor shall be given notice of any such conditions and given a reasonable opportunity to correct them. If work is done by the Owner pursuant to this paragraph which is necessitated by any act or failure to act of the Contractor, the costs associated with such work, including Owner's expenses and compensation for the Architect's additional services and expenses, shall be deducted from any sums due the Contractor and a written Change Order or Construction Change Directive`, adjusting the contract sum will be issued. If payments then or thereafter due to the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a properly prepared, timely request for information (RFI) in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 Contractor's request for information, interpretation, or clarification shall be made to Architect in writing on Request For Information (RFI) form furnished by Architect. Contractor to submit completed copy of form completely filled out with request clearly stated. Reference all applicable drawings by detail and Specifications by section and paragraph. RFIs to be numbered sequentially (1, 2, 3, 4, etc.). Architect will return a single copy to Contractor. Contractor will copy and distribute to all parties affected by response.

§ 3.2.4 Contractor accepts full responsibility for use of any information indicated in soil borings, test excavations and other subsurface investigations contained in reports provided in the bidding documents. The Contractor shall obtain at its own expense, any additional information necessary to perform the Work.

§ 3.2.5 In event of inconsistency between portions of Contract Documents or within Contract Documents; Contractor shall provide better quality or greater quantity of Work, or comply with more stringent requirement, either or both in accordance with Architect's interpretation.

§ 3.2.6 Contractor shall not make a claim, exceeding actual cost of work, if, in performing the Work, he finds actual subsurface conditions encountered which do not conform to those indicated by soil borings, test excavations, and other subsurface investigations.

§ 3.2.7 Contractor acknowledges that it has examined all documents pertaining to the Work, examined character of site and any existing structures, and has satisfied itself as to nature of the Work, and all other matters, which can in any way affect the Work.

§ 3.2.8 The Contractor shall resolve all reported deficiencies with the Architect prior to awarding any subcontracts or starting any work with the Contractor's own employees. If any deficiencies cannot be resolved by the Contractor without additional time or additional expense, the Contractor shall so inform the Owner in writing. Any work performed prior to receipt of instructions from the Owner will be done at the Contractor's risk.

§ 3.2.9 The Contractor shall be liable to the Owner or Architect for damage resulting from errors, inconsistencies or omissions in the Contract Documents the Contractor recognized or should have recognized and failed to report to the Architect. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the Architect, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

§ 3.2.10 The following principles shall govern the settlement of disputes which may arise over discrepancies in the Contract Documents: (a) as between figures given on Drawings and the scaled measurements, the figures shall govern – no measurements shall be taken by scale as working dimensions except on large-scale Drawings not dimensioned in detail; (b) as between large-scale Drawings and small-scale Drawings, the larger scale shall govern; (c) as between Drawings and Specifications, requirements of the Specifications shall govern; and (d) as between the Agreement and the Specifications, requirements of the Agreement shall govern. The principles set forth herein shall not alter provisions of Article 1.2.

§ 3.2.11 Any design errors or omissions noted by the Contractor during this review shall be reported promptly to the Architect, but it is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents. The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations**,** unless they bear upon construction means, methods, techniques or safety and health precautions, but any nonconformity discovered by or made known to the Contractor shall be reported promptly to the Architect.

§ 3.2.12 If Contractor fails to give such notice and, knowingly, proceeds with Work affected by errors or omissions in the Contract Documents, he shall correct any such errors, inconsistencies, or omissions at no additional cost to Architect and Owner.

§ 3.2.13 If the Contractor believes that additional cost or time is involved because of clarifications, interpretations or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.11 the Contractor shall make Claims as provided in Section 4.3. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.11, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. The Contractor shall not be liable to the Owner or Architect for damages resulting from errors, or omissions in the Contract Documents or for differences between field measurements or conditions and the Contract Documents unless the Contractor should have recognized or recognized such error, , omission or difference and failed or knowingly failed to report it to the Architect.

§ 3.2.14 In the event any error, inconsistencies, omission, or discrepancy in or between drawings and specifications exists or appears to exist, the Contractor shall not attempt to profit from such unintentional error, inconsistencies, omission, or discrepancy.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract.

§ 3.3.1.2 Any instructions that the Architect may issue to the Contractor shall be adjudged an interpretation of the requirements of the Contract Documents and not an act of supervision. The Architect has no authority and accepts no responsibility, either direct or implied, to direct and superintend the work.

§ 3.3.1.3 Coordination drawings: See Division 1.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 Contractor is solely responsible for coordination of scope of Work of Subcontractors and Suppliers, and to complete all Work, whether performed by the Contractor or a Subcontractor.

§ 3.3.5 The Contractor shall employ Licensed Surveyor to locate and stake out the Work and establish necessary reference and bench marks. Work from established bench marks and reference points, lay out and correctly establish all lines, levels, grades and locations of all parts of their own Work and be responsible for their accuracy and proper correlation with Work and established data.

§ 3.4 LABOR AND MATERIALS
§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, air conditioning (heating and cooling), utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.1.1 Delivery, handling and storage of materials and equipment: See Division 1.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only if allowed by the Contract Documents and with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.2.1 Product options and substitutions after execution of contract: See Division 1.

§ 3.4.2.2 No substitutions of materials, products, or manufacturers will be considered under this Contract except under one or more of the following circumstances:

1. The substitution is required for compliance with subsequent interpretations of code or insurance requirements.
2. The specified product is unavailable through no fault of the Contractor.
3. The manufacturer or fabricator refuses to certify or guarantee the specified product as required.
4. Subsequent information reveals that the specified product is unable to perform properly or to fit in the designated space.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 The Contractor shall insure that all product suppliers and Subcontractors, adhere to the Contract Documents and that they order products on time, taking into account the current market and delivery conditions, and that they provide products on time. The Contractor shall keep the Architect informed as to the availability of all specified materials and equipment and shall advise him promptly, in writing, of all material and equipment that may not be obtainable, or the availability of which may be delayed, whether due to conditions of the market or other limiting or governing factors beyond the Contractor's control.

§ 3.5 WARRANTY
The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Owner or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.1 Warranties and guarantees: See Division 1.

§ 3.6 TAXES
§ 3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor which are legally enacted when Contractor's bids were received or negotiations between Owner and Contractor were concluded, whether or not yet effective or merely scheduled to go into effect. Contractor shall provide a sales tax report with each pay request, itemizing all state and local taxes paid for the period.

§ 3.6.2 Contractor shall pay all sales, consumer, use and other similar taxes on all material and equipment not purchased directly by Owner, which are legally enacted at time bids are received, whether or not yet effective.

§ 3.6.2.1 If the Contractor fails to submit a Sales Tax Report with each Application for Payment, the Owner will not pay such application until the required report is received by the Owner. Where no sales taxes have been paid for a particular month, a Sales Tax Report stating " No Taxes Paid" shall be submitted.

§ 3.6.3 Contractor shall require all Subcontractors, Sub-subcontractors and suppliers to bill Contractor for all sales and use taxes on all materials and equipment incorporated into Project as clearly discernible separate item to facilitate Contractor's keeping tax as separate item of expense on records. Furnish the tax information on the Owner's Sales Tax Report form provided in the Contract Documents, in order to enable Owner to meet state reporting requirements.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS
§ 3.7.1 The Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded. A copy of the building permit and heating/ventilating/air-conditioning, plumbing, electrical and other trade permits required for the Project shall be submitted to the Architect with or prior to the first Application for Payment.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.2.1 If the Contractor fails to give such notices, it shall be liable for and shall indemnify and hold harmless the Owner and the Architect, and their respective employees, officers and agents, against any resulting fines, penalties, judgments or damages, including reasonable attorney's fees, imposed on or incurred by the parties indemnified hereunder.

§ 3.7.2.2 The Contractor, his Subcontractors and all trades people working on the Project who are required by statute to be licensed shall have a current license in good standing before commencing any operations on the premises.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, without such notice to the Architect and Owner, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction, including any fines or other damages realized.

§ 3.7.4 Upon completion of the Work, the Contractor shall deliver to the Owner and Architect original copies of all required final certificates of inspection, the Certificate of Occupancy, and other documents evidencing that inspections required by authorities having jurisdiction over the Work have been performed.

§ 3.8 ALLOWANCES
§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by Allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated Allowance amounts shall be included in the Allowances; and
- **.3** whenever costs are more than or less than Allowances, the Contract Sum shall be adjusted accordingly by Change Order or Construction Change Directive. . The amount of the adjustment shall reflect (1) the difference between actual costs and the Allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner in sufficient time to avoid delay in the Work.

§ 3.8.4 The amount due the Contractor for any Allowance shall be based upon certified copies of invoices from suppliers and Subcontractors and shall not include any costs provided for in Paragraph 3.8.2.2.

§ 3.8.5 Allowances: See Division 1.

§ 3.9 SUPERINTENDENT
§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding on the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case. The Contractor's Project Manager and Superintendent shall be satisfactory to Owner and if requested in writing by Owner, shall be changed within 14 days.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review.

§ 3.9.3 The Contractor shall not change the superintendent without the prior written consent of the Owner, which consent shall not be unreasonable withheld. The superintendent shall be present at the Project until final completion. At the Owner's request, the Contractor shall assign a different superintendent to the Project.

§ 3.9.4 As directed by the Architect, there is to be held a regularly scheduled meeting of the representatives of the various trades engaged about the Work, for furthering the progress of the Work and giving of clarifications by the Architect.. If the Contractor's representatives fail in attendance or in

executing the instructions given them, they shall on request of the Owner be dismissed from the Work and other qualified representatives must be immediately substituted.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall be revised at monthly intervals or as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The construction schedule shall not be changed without the written consent of the Owner and Architect.

§ 3.10.2 The Contractor shall prepare a submittal schedule after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 Construction schedules: See Division 1.

§ 3.10.5 Progress Reports: See Division 1.

§ 3.10.6 The Contractor shall furnish such manpower, materials, facilities and equipment and shall work such hours, including night shifts, overtime operations and Sundays and holidays, as may be necessary to insure the progress and completion of the Work in accordance with the approved and currently updated progress schedule. Should the Contractor fail to start any activity on the start date shown in the Contractor's Construction Schedule, or otherwise become delayed, he shall, without being entitled to any increase in the Contract Sum or other compensation, work overtime, increase his work force, or take such other actions as may be necessary or appropriate to complete the activity by the Completion Date shown on the Construction Schedule, or as such activity's completion date may have been adjusted by a revised Construction Schedule prepared to reflect an agreed-to extension of the Contract Time and incorporated into the Contract by an appropriate Change Order or Change Order Directive.

§ 3.10.7 The Architect may require the Contractor to submit, within seven calendar days following receipt of written notice, a recovery schedule demonstrating this program and the Contractor's proposed plan to make up the lag in scheduled progress and to insure completion of the Work within the Contract Time. If the Architect finds the proposed plan not acceptable, he may require the Contractor to submit a new plan.

§ 3.10.8 Failure of the Contractor to substantially comply with the requirements of this Paragraph 3.10 may be considered grounds for a determination that the Contractor is failing to execute the Work with sufficient diligence to ensure its completion with the Contract Time.

§ 3.10.9 If the Contractor, without any fault on his part, is delayed in beginning any activity identified on the Progress Schedule he shall, nevertheless, have the same number of days as is shown in the Progress Schedule for the activity and the time for any succeeding activity that is dependent upon that activity shall be adjusted accordingly, provided that any time the Owner requires the Contractor to work overtime, to increase his forces, or to take any necessary or appropriate action to decrease the time required for any activity, the Contractor shall be entitled to an appropriate adjustment in the Contract Price.

§ 3.10.10 The Contractor shall provide any and all information with respect to the progress of the Work and scheduling as the Owner may reasonably require.

§ 3.10.11 If the completion of the Work or any milestone date is delayed by any fault, neglect, act or failure to act on the part of the Contractor, the Contractor shall in addition to all other obligations, and at no cost or expense to the Owner, take such actions, including but not limited to, increasing manpower, work such overtime may be necessary to make up for all time lost and to avoid delay in the progress and the completion of the Work.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE
The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Owner upon completion of the Work.

§ 3.11.1 Project record documents: See Division 1.

§ 3.11.2 The Contractor shall record on the record copy of the Drawings maintained at the site all changes and selections made during construction and shall locate by dimensions showing actual field measurements of all major items which will be concealed in the completed work. These items shall include underground piping and conduit beneath slabs-on-grade (or basement slabs), underground site utilities such as pipe, conduit, etc.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged. Submit samples requiring color or finish selection in a single, coordinated submittal. The Architect will not approve color or finish schedule until he has received all samples and other data necessary for making complete color selections for the Project.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. The Contractor shall sign each submittal and stamp with, “REVIEWED FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS AND APPROVED”. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect without action.

§ 3.12.6 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor and Subcontractor represents that the Contractor and Subcontractor has reviewed for compliance with the Contract Documents, and has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the

information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.11 Submittals: See Division 1 for additional requirements.

§ 3.13 USE OF SITE
The Contractor shall confine operations at the site to areas permitted by the Owner, applicable laws, statutes, ordinances, permits, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.1 Continued occupancy of existing facilities: See Division 1.

§ 3.13.2 Construction facilities, temporary controls and utilities: See Division 1.

§ 3.14 CUTTING AND PATCHING
§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.14.3 Cutting and patching: See Division 1.

§ 3.14.4 The Contractor is responsible for all cutting, patching, and finishing of walls, floors, roofs, etc., to allow demolition and installation of equipment, piping, ductwork, conduit, wiring, fixtures etc. within existing facilities. Any openings through existing concrete shall be core drilled. Prior to undertaking cutting or drilling operations the Contractor shall verify that no structural or other damage will be caused by the drilling process. Prior to all core drilling the trade Contractor shall make adequate provisions to protect areas from water damage and debris. Provide means to collect all water and debris or use a dry method acceptable to the Owner. No structural member shall be cut without prior written approval from the Architect. The Contractor shall employ acceptable (to the Owner) experienced installers to patch finishes.

§ 3.15 CLEANING UP
§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents after reasonable notice from the Owner of such failure, the Owner may do so and the cost thereof shall be charged to the Contractor.
§ 3.15.3 Cleaning: See Division 1.

§ 3.15.4 Removal of debris and waste material shall be performed a minimum of one time daily and additionally as required to keep debris and waste from stockpiling and creating a potential fire or safety hazard.

§ 3.16 ACCESS TO WORK
The Contractor shall provide governmental authorities who may lawfully request access to the work, and the Owner and Architect proper facilities and equipment for access to the Work in preparation and progress wherever located.

§ 3.16.1 Emergency vehicle access to the existing facilities must be maintained at all times. Particular care shall be taken to minimize the off loading time of material delivery trucks. The Contractor shall provide a flagman with a radio to provide for immediate relocation of trucks in the event of an emergency.

§ 3.16.2 The existing roofs shall be protected as required during the construction to prevent any damage and or leaks. The integrity of the roofing membrane shall be maintained on a daily basis. All cuts for work such as installing new assemblies shall be completely sealed each day.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS
The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss (including but not limited to attorney's fees, court cost, and other costs of defense) on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright, trademark, trade name, or similar property right or interest, or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION
§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them ("Indemnitees") from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by them or anyone for whose acts they may be liable. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity entitled to be indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 3.18.3 Contractor agrees to indemnify and hold Indemnitees harmless from any and all loss or damages, including reasonable attorney fees, arising out of any lien claims on the Project or its funds, jurisdictional labor disputes or other labor troubles of any kind that may occur during performance of Contract.

§ 3.18.4 The purchase of insurance by the Contractor with respect to the obligations required herein shall in no event be construed as fulfillment of discharge of such obligations

§ 3.18.5 None of the foregoing provisions shall deprive the Indemnitees, or the Contractor of any action, right or remedy otherwise available to them or any of them pursuant to the laws of the State in which the Project is located.

§ 3.18.6 Notwithstanding any contrary provision herein or elsewhere in the Contract Documents, the Contractor shall not be obligated to indemnify and hold harmless any Indemnitee against liability for damages arising out of bodily injury to persons or damage to property, proximately caused by or resulting from the negligence, in whole or in part, of such Indemnitte, in violation of N.C.G.S 22B-1 or any amendment thereto. Any such provision shall be stricken and the remainder of such indemnification obligations shall remain in full force and effect.

§ 3.19 PERSONS AUTHORIZED TO SIGN DOCUMENTS
§ 3.19.1 The Contractor, prior to the execution of the Agreement between the Owner and Contractor shall file with the Architect a list of all persons in his firm who are authorized to sign documents such as contracts, certificates, and affidavits on behalf of the firm and to fully bind the firm to all the conditions and provisions of such documents, except that in the case of a corporation he shall file with the Architect a certified copy of a resolution of the Board of Directors of the corporation in which are listed the names and titles of corporation personnel who are authorized to sign documents on behalf of the corporation and to fully bind the corporation to all the conditions and provisions of such documents.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL
§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect" means the Architect or the Architect's authorized representative, or such representative as the Architect may designate, who may be employed by the Architect as a consultant.

§ 4.1.1.1 Each of these terms; “Architect”, ”Engineer”, “Architect/Engineer”, “A/E” or ” Engineer/Architect” shall mean The East Group, PA, or an affiliate as otherwise provided in Contract Documents, or duly authorized representatives, such representatives acting severally within scope of particular duties entrusted to them, unless otherwise provided in Contract Documents.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT
§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents, and will be an Owner's representative (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the one-year period for correction of Work described in Paragraph 12.2. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract; however, such authority shall not be considered or construed as creating a fiduciary relationship between the Architect and Owner.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of the Contractor's operations, or as otherwise agreed by Owner and Architect, and as Architect deems necessary (1) to become generally familiar with and to keep the Owner informed about the progress and aesthetic quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the Work, and (3) to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site evaluations or inspections to check the quality or quantity of the Work. The Architect will neither have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences or procedures, or for the safety or health precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Subparagraph 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor’s failure to perform the Work in accordance with the requirements of the Contract Documents or failure to complete work on schedule. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect’s consultants shall be through the Architect, unless otherwise approved by the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner. Routine written communications between the Architect and the Contractor shall be in letter, memo, email or fax form. Such communications shall not be identified as “request for information’, nor shall they substitute for any other written requirement pursuant to the provisions of the Contract Documents.

§ 4.2.5 Based on the Architect’s evaluations of the Contractor’s Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work. All costs made necessary by Contractor's failure to perform Work which conforms to the Contract Documents, including those of repeated procedures, shall be at Contractor's sole expense, including compensation for Architect's services and expenses.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Such review and action on the part of the Architect is limited to only those submittals identified in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review by the Architect, Architect's consultants, and Owner, if needed. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety or health precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's review or approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives or other change documents for changes in the Work for the Owner's approval and execution, and the Architect may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents as required by the Contract Documents and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment based upon the final inspection indicating the Work complies with the requirements of the Contract Documents, pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such Project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 Project Representative may be employed at site by Architect. Project Representative's duties, responsibilities and limitations of authority are as set forth in an agreement between Owner and Architect, and will be provided upon request.

§ 4.2.11.1 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If no agreement is made concerning the time within which interpretations required of the Architect shall be furnished in compliance with this Paragraph 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretations until 21 days after receipt of written notice.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 Subject to the Owner's approval, the Architect's decisions on matters relating to aesthetic effect, will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.13.1 The Architect will not undertake to settle differences between the Contractor, Subcontractors or suppliers or act as arbiter as to which Subcontractor, trade or supplier is to furnish or install various items indicated or required.

§ 4.2.14 The Architect will review and respond to requests for information (RFI) about the Contract Documents. The Architect's response to such requests will be made in writing within seven days upon receipt. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

§ 4.2.15 The Architect's response to a request for information (RFI), or issuance of a clarification or interpretation shall be considered an interpretation, clarification, supplemental information or an order for a minor change in the Work not involving an adjustment in Contract Sum or extension of Contract Time and not inconsistent with the intent of the Contract Documents, and shall be binding, unless indicated otherwise in the Architect's response to the RFI.

§ 4.3 CLAIMS AND DISPUTES
§ 4.3.1 DEFINITIONS
A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be initiated by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 4.3.1.1 CLAIMS MUST CONTAIN FOLLOWING INFORMATION:

.1 Date of the event giving rise to such Claim and, if applicable, date when the event ceased;
.2 Nature of occurrence or condition giving rise to the Claim;
.3 Identification of contractual provisions affected, and a detailed explanation of how the Claim is contrary to those provisions;
.4 An estimate of any change in the Contract Sum, including an itemized breakdown of additional cost, if any;
.5 An estimate of the effect upon Project Schedule, including a comparison of Project Construction Schedule and schedules prepared in connection with the Claim. If required by Owner or Architect, this shall include showing in CPM format, both critical and non-critical path activities affected, and showing Project Construction Schedule and Claim sequences, durations and float substantiating delay claimed.

§ 4.3.2 TIME LIMITS ON CLAIMS INITIATED PRIOR TO FINAL PAYMENT
Claims by either party must be initiated and submitted within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be initiated by written Notice to the Architect and the other party.

§ 4.3.3 CONTINUING CONTRACT PERFORMANCE
Pending final resolution of a Claim except as otherwise agreed in writing or as provided in Subparagraph 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 4.3.4 CLAIMS FOR CONCEALED OR UNKNOWN CONDITIONS
If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made and submitted within 21 days after the Architect has given notice of the decision. If the conditions encountered are materially different, the Contract Sum and Contract Time shall be equitably adjusted, but if the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect for initial determination, subject to further proceedings pursuant to Paragraph 4.4.

§ 4.3.5 CLAIMS FOR ADDITIONAL COST
If the Contractor wishes to make Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Paragraph 10.4.

§ 4.3.6 If the Contractor believes additional cost is involved for reasons including but not limited to (1) a written interpretation from the Architect, (2) an order by the Owner to stop the Work where the Contractor was not at fault, (3) a written order for a minor change in the Work issued by the Architect, (4) failure of payment by the Owner, (5) termination of the Contract by the Owner, (6) Owner's suspension or (7) other reasonable grounds, Claim shall be filed in accordance with this Paragraph 4.3.

Notwithstanding anything to the contrary in the Contract Documents, an extension in the Contract Time, to the extent permitted under the Contract Documents shall be the sole remedy of the Contractor for any (1) delay in the commencement, prosecution or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity, or (4) other similar claims (collectively referred to in this Paragraph as Delays) whether or not such Delays are foreseeable, unless a Delay is caused by acts of the Owner constituting active interference with the Contractor’s performance of the Work, and only to the extent such acts continue after the Contractor furnishes the Owner with written notice of such interference. In no event shall the Contractor be entitled to any compensation or recovery of any damages, in connection with any Delay, including, without limitation, extended site conditions, consequential damages, lost opportunity costs, impact damages or other similar remuneration. The Owner’s exercise of any of its rights or remedies under the Contract Documents (including, without limitation, ordering changes in the Work, or directing suspension, rescheduling or correction of the Work), regardless of the extent or frequency of the Owner’s exercise of such rights or remedies, shall not be construed as active interference with the Contractor’s performance of the Work.

§ 4.3.7 CLAIMS FOR ADDITIONAL TIME
If the Contractor wishes to make Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

§ 4.3.7.1 Only delay impacting the critical path of the Work shall be considered when determining if Contractor is entitled to additional time.

§ 4.3.7.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction and delay impacting the critical path of the Work..

§ 4.3.8 CLAIMS FOR INJURY OR DAMAGE TO PERSON OR PROPERTY:
If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to evaluate the matter.

§ 4.3.9 CLAIMS FOR ADJUSTMENTS TO UNIT PRICING
If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 4.3.9.1 Unit Prices: See Division 1.

§ 4.4 RESOLUTION OF CLAIMS AND DISPUTES
Claims, including those alleging an error or omission by the Architect but excluding those arising under section 10.3, shall be referred initially to the Architect for decision. An initial decision by the Architect shall be required as a condition precedent to mediation, or litigation of all Claims between the Contractor and Owner arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Architect with no decision having been rendered by the Architect. The Architect will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 4.4.1 The Architect will review Claims and within ten days of the receipt of the Claim, take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Architect is unable to resolve the Claim if the Architect lacks sufficient information to evaluate the merits of the Claim or if the Architect concludes that, in the Architect's sole discretion, it would be inappropriate for the Architect to resolve the Claim.

§ 4.4.2 In evaluating Claims, the Architect may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Architect in rendering a decision. The Architect may request the Owner to authorize retention of such persons at the Owner's expense.

§ 4.4.3 If the Architect requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either provide a response on the requested supporting data, advise the Architect when the response or supporting data will be furnished or advise the Architect that no supporting data will be furnished. Within 21 days of receipt of the response or supporting data, if any, the Architect will either reject or approve the Claim in whole or in part.

§ 4.4.4 The Architect will approve or reject Claims by written decision, which shall state the reasons therefore and which shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Architect shall be final and binding on the parties but subject to mediation and arbitration, if allowed by this document.

§ 4.4.5 Upon receipt of a Claim against the Contractor or at any time thereafter, the Architect or the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Architect or the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 4.4.6 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines prior to a decision on the Claim by the Architect, prior to any required mediation or arbitration by the terms of this Contract.

§ 4.5 DISPUTE RESOLUTION

4.5.1 In the event of any dispute, claim, question or disagreement arising out of or relating to this Agreement or breach thereof, the parties hereto shall use their best effort to settle such matters by mutual agreement. To this effect, responsible, authorized representatives of the parties shall meet, consult and negotiate with each other in good faith, and, recognizing their mutual interests, attempt to reach a joint and equitable solution satisfactory to both parties. If they do not reach such solution within a period of thirty (30) days after the first notice by either party to the other of the existence of the dispute, and upon notice of either party to the other, the dispute shall be resolved by proceeding with the dispute resolution procedures set forth herein below.

A. It the parties fail to agree on the resolution of any dispute through the negotiation process above, the parties shall proceed in good faith to attempt to settle the dispute through mediation by mediation either (1) under the Construction Industry Mediation Rules of the American Arbitration Association ("AAA") in accordance with its rules governing the mediation of such disputes or (2) any other procedure agreed upon by the parties. Any party who chooses to first refer the dispute to mediation may, in its notice to the other, elect to refer the matter to either the AAA or other agreed upon administrator of mediation. Mediation is a precondition to further dispute resolution by the parties, and the dispute resolution procedure set forth herein below shall only be available following a declaration of impasse by the mediator or by the mutual agreement of the parties.

B. If impasse is declared in any mediated dispute, the matter shall be submitted to arbitration with the AAA under its Construction Industry Rules or such other arbitration procedure agreed upon by the parties. Notice of intent to seek arbitration of any unresolved dispute shall be given by the claiming party within ten (10) days of the declaration of impasse. The responding party shall select either AAA or other administrator agreed upon with the claiming party, within seven (7). days of the receipt of the notice of intent to arbitrate.

C. The following additional rules and procedures shall apply to all disputes arising under this Agreement and shall be in addition to or, in the case of any conflict with, shall be in lieu of the applicable rules of the AAA or other agreed upon administration rules:

(1) The parties acknowledge that this Agreement may evidence a transaction involving interstate commerce. Nonetheless, in rendering the award, the arbitrator(s) shall determine the rights and obligations of the parties according to substantive and procedural laws of the State of North Carolina, in general, and the North Carolina Revised Arbitration Act, in particular.

(2) All negotiations and mediation sessions and all arbitration hearings shall take place in Onslow County, North Carolina, or such other place as the parties may agree upon.

(3) In the arbitration of any dispute less than $250,000, the sole arbitrator shall be a retired North Carolina or Federal Judge residing in the State of North Carolina. In disputes of $250,000 or more, an arbitration panel of three (3) experienced construction industry professionals shall be appointed and shall include (a) one architect or engineer familiar with construction of health care facilities, (b) one experienced construction attorney or retired State of Federal Judge residing in the State of North Carolina, and (c) a senior staff representative of a public or private owner of a facility of the kind described in the Contract Documents.

(4) The Owner, the Contractor all Subcontractors, material suppliers, engineers, designers; architects, and their respective bonding companies and insurers and all other parties concerned with the construction of the improvements described in this Agreement are bound by this Dispute Resolution Clause to the greatest extent permitted by law, and all such parties consent and agree to the consolidation of all phases of the dispute resolution process hereunder with the dispute resolution proceedings pending among other parties whenever such proceeding arises out of the same transaction or are related to the same subject matter. The motion to consolidate may be made by any interested party and will be by an order of the arbitrator(s) petitioned, or if such arbitrator(s) fail to make such order, parties may apply to the Superior Court in Onslow County, North Carolina, for such order.

(5) At any time in the dispute resolution proceeding, the parties may agree to a high/low limitation which shall be binding upon all further proceedings.

(6) Discovery procedures may not be undertaken during negotiations or mediation phases. However, the parties shall proceed in good faith to make disclosure to the other party of all facts, documents, records and other evidence upon which each party bases its claim or defense.

(7) Prior to any arbitration hearing, limited discovery shall be permitted for the purpose of obtaining production of documents and taking depositions. All discovery shall be governed by the North Carolina Rules of Civil Procedure. All issues regarding conformation with discovery requests shall be decided by the arbitrator(s). Request for discovery shall be initiated within thirty (30) days after the notice of intent to arbitrate is given and shall be fully responded to within thirty (30) days after receipt. All discovery, including depositions, shall be completed within seventy-five (75) days of the notice of intent to arbitrate or within the time the arbitrator(s), upon motion by either party, may extend or reduce the time for discovery.

(8) The arbitrators' award shall be in writing and upon the request of either party made prior to the initial hearing, shall include findings of fact and conclusions of law which support the award.

(9) Either party may appeal the arbitration award to appellate arbitration by filing with the AAA or the agreed upon administrator, within twenty (20) days after transmittal of the award, a written brief, not to exceed twenty (20) pages, stating the reason why the arbitrator(s)' decision should be reversed or modified. The opposing party shall have twenty (20) days to file a responsive brief, not to exceed twenty (20) pages. An appellate arbitrator shall be appointed by the AAA or agreed upon administrator, and shall be a retired North Carolina Superior Court or Appellate Judge. Either party may request oral argument which must be concluded within fourteen (14) days following submission of the final brief. No additional evidentiary material may be introduced in the appellate arbitration. The appellate arbitrator shall render a written decision affirming, reversing, modifying or remanding the arbitrator(s)' decision within twenty (20) days after receiving the final appellate submission.

The appellate arbitrator may base its decision only on one of the following grounds:

(a) Any ground specified in the Revised Uniform Arbitration Act Section 1-569.23;
(b) A material error of applicable law by the arbitrator;
(c) A determination that the award was partially wholly arbitrary or capricious.

The appellate arbitrator may render a final decision on appeal or may remand the matter for further proceeding by the arbitrator(s).

(10) All fees and expenses of the mediation and of the arbitration procedures shall be borne by the parties equally. However, each party shall bear the expense of its own counsel, experts, witnesses, and preparation and presentation of proofs. Only in the case of extreme abuse of the procedure may the arbitrator(s) reallocate such costs and expenses among the parties.

(11) The dispute resolution procedures set forth hereinabove shall be the exclusive remedies available to the parties to the Agreement to settle or resolve any and all disputes arising there under and any settlement or arbitral award may be enforced by an action in the Superior Court of Onslow County, North Carolina.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.1.3 Architect is not required to, but shall be allowed to contact any Subcontractor, Sub-subcontractor, vendors or materials supplier when it is necessary for the Architect to obtain any form of input from these sources that the Architect may require for the completion of Architect's services on the Project. Requests for information, interpretation or clarification, and correspondence must all be in writing and must be routed through Contractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK
§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, within 15 days after award of the Contract, shall furnish in writing to the Owner and the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Owner and/or Architect will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.2.5 Acceptance of or failure to object to any or all listed Subcontractors or Sub-subcontractors by the Owner or Architect does not relieve Contractor from any responsibility for their failure to properly perform their work on the Project..

§ 5.3 SUBCONTRACTUAL RELATIONS
By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.1 Contractor is fully responsible for acts and omissions of Subcontractors, Sub-subcontractors and persons either directly or indirectly employed by them, or under their control, as Contractor is for its own employees.

§ 5.3.2 Nothing in Contract Documents creates any contractual relationship between any Subcontractor or Sub-subcontractor or other tiers, and Owner or Architect, except for provisions in paragraph 5.4**.**

5.3.3 The Contractor shall assure the Owner, by written affidavit or in such other manner as the Owner may approve, that all agreements between the Contractor and his subcontractors incorporate the provisions of subparagraph 5.3 as necessary to preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the Work to be performed by Subcontractors so that the subcontracting thereof will not prejudice such rights.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS
§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract except to the extent the Owner has previously paid Contractor for a Subcontractor's work but Contractor failed to pay Subcontractor. In such event, if the Owner has required the Contractor to provide a Payment Bond and Subcontractor shall seek recovery of such past due amounts only from the Payment Bond Surety.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increased cost of mobilization resulting from the suspension.

§ 5.4.2.1 Contractor will provide copies of its subcontracts, agreements and current information on status of its accounts, upon demand by Owner.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity including a completion contractor retained by the Surety.

§ 5.5 ASSIGNMENT OF MATERIALS AND EQUIPMENT
§ 5.5.1 The Contractor accepts assignment of, and liability for, all purchase orders and other agreements for procurement of materials and equipment that are identified as part of the Contract Documents. The Contractor shall be responsible for such pre-purchased items, if any, as if the Contractor were the original purchaser. The Contract Sum includes, without limitation, all costs and expenses in connection with delivery, storage, insurance, installation and testing of items covered in any assigned purchase orders or agreements. All warranty and correction of the Work obligations under the Contract Documents shall also apply to any pre-purchased items, unless the Contract Documents specifically provide otherwise.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS
§ 6.1.1 Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Work by others: See Division 1.

§ 6.2 MUTUAL RESPONSIBILITY
§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor to report shall constitute an acknowledgment that the Owner's or separate contractors completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor or others for which it is responsible, causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP
If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises, jobsite, lay down and staging area and surrounding area free from waste materials and rubbish, the Owner may clean up after written notice, and the cost will be paid for by the Contractor.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL
§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Change Proposal Request, Construction Change Directive, clarification, interpretation or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order or Change Proposal Request shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; a clarification, interpretation or order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Change

Proposal Request, Construction Change Directive, clarification, interpretation or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order or Change Proposal Request (CPR) is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Methods used in determining adjustments to the Contract Sum are those listed in Subparagraph 7.3.3.

§ 7.2.3 Methods used in determining adjustments to Contract Time are subject to provisions in 4.3.7 and 7.5.6.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect or Owner and signed by the Owner , directing a change in the Work, prior to any agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order or Change Proposal Request.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee;
- **.4** As provided in Section 7.3.7, 7.5.4 and 7.5.5.or
- **.5** Costs incurred by Owner due to the Contractor's failure to perform its obligations under the Contract**.**

§ 7.3.4 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.4.1 Failure of Contractor and Owner to agree on an adjustment of Contract Sum or Contract Time shall not excuse Contractor from proceeding with prosecution and performance of Work not affected by Construction Change Directive. Contractor and Subcontractors, Sub-subcontractors and Suppliers shall administer all disputes in a manner which will permit Work to proceed on schedule while the matter in dispute is being resolved.

§ 7.3.5 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.6 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an

increase in the Contract Sum, an amount for overhead and profit in accordance with subparagraph 7.5.4, In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to those listed in subparagraph 7.5.4.

§ 7.3.7 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change. This pertains to costs associated with Change Orders, Change Proposal Request, Construction Change Directives, and Claims.

§ 7.3.7.1 In determining the total cost or credit to the Owner resulting from a change in the Work, the allowances for overhead and profit combined, including the total cost to the Owner, shall not exceed the percentages herein scheduled, as follows:

(1) For the General Contractor, for any work performed by his own forces, 10% of the direct cost;
(2) For each Subcontractor involved, work performed by his own forces, 10% of the direct cost;
(3) For the General Contractor, for work performed by his subcontractor, 5% of the amount due the subcontractor.

§ 7.3.8 For any portion of such cost that remains in dispute, the Architect will make a determination. That determination of cost shall adjust the Contract Sum, subject to the right of either party to disagree and assert a claim in accordance with Article 4.

§ 7.3.9 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order or Change Proposal Request (CPR).

§ 7.4 MINOR CHANGES IN THE WORK
The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

§ 7.5 CHANGE PROPOSAL REQUESTS
§ 7.5.1 Change Proposal Request (CPR) defines proposed changes in the Work, and is prepared and forwarded to Contractor by Architect.

§ 7.5.2 Upon receipt of a Change Proposal Request, Contractor and Subcontractors shall review and evaluate the scope of the changes, and if any potential impact on Project is determined, shall notify Owner immediately. If there is a potential impact, the Owner may direct Contractor to stop Work in area affected by change to minimize the cost impact, or may direct Contractor, to proceed with the change.

§ 7.5.3 Contractor shall submit proposal to Architect within 10 days after receipt of a Change Proposal Request, in such form as the Architect may prescribe, and an itemized accounting together with appropriate supporting data to substantiating adjustments in Contract Sum and/or Contract Time, if any.

§ 7.5.4 All proposals shall be accompanied by a complete itemization and costs changes, including labor, materials, equipment and Subcontractors. Subcontractors and suppliers cost itemization shall also be provided. Method used to determine an adjustment in Contract Sum shall be limited to the following:

.1 Labor Wages: Itemized by each craft involved, indicating hourly rate for each and hours required excluding premium pay, paid to employees directly engaged in work. Rates shall be the actual rate paid the workman in accordance with established management labor agreements.

.2 Labor Burden: Percent of actual wages for each craft includes: Mandatory fringe benefits required by established agreements, Vacation, Health and Welfare, Pension, Apprenticeship and other required programs, Social Security, and Unemployment Insurance.
.3 Subsistence and/or Mileage: If in union agreements.
.4 Materials and Equipment: Materials incorporated in Work at Contractor's actual invoice cost, including freight, and state sales tax. Indicate unit rates and units required
.5 Overhead and Profit: 10 percent of net increase of labor and material for work performed by own forces. Includes, but not limited to: estimating; field supervision above foremen level superintendents, assistant superintendents, general foremen, engineers, accountants, timekeepers, office managers, and others on staff; office supplies; drinking water; temporary heat, temporary cooling, light and power; field toilets; small tools; record documents; and other cost of materials and/or equipment not incorporated in Work or directly associated with Work, including home office costs.
.6 Directed Premium Time on Contract Work: Actual premium portion of wages for original contract Work which the Contractor was directed by Owner to be performed other than normal working hours, including; Social Security Taxes, Unemployment Insurance, and Union Fringe Benefits if required by Union Agreements, without overhead and profit mark-up.
.7 Major Construction Equipment:
.7.1 Contractor Owned: Cost not to exceed 85 percent of current prevailing rates for rental of appropriate equipment for job and time period of use.
.7.2 Leased: Contractor's reasonable invoiced cost, (except lease-purchase Contractor equipment which is considered "Contractor owned").
.8 Subcontractor Cost: Quoted in same manner prescribed for Contractor.
.9 Overhead and Profit on Subcontractor’s Work: 5 percent on net increase of Subcontractor’s Work.
.10 Bond and Insurance: Actual amount to be paid to surety and insurance carrier by Contractor without mark-up.

§ 7.5.5 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be net cost. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.5.6 Only delay impacting the critical path of the Work shall be considered when determining if Contractor is entitled to additional time. If proposals include a change in time, the Contractor shall substantiate the number of days. An estimate of cost and of probable effect of delay on the Work progress and Project schedule shall be included to substantiating potential delay, including a comparison of Project Construction Schedule and schedules prepared to substantiate a change in time, indicated in CPM format both critical and non-critical path activities affected, and show Project Construction Schedule and change sequences, durations and float.

§ 7.5.7 Owner shall have the right within its sole discretion to require Contractor to commence performance of changes to Work based on Change Proposal Request prior to the submission by Contractor of cost proposal, or Owner’s approval of the proposal. In such case, Contractor shall proceed with Work so changed upon receipt of a Construction Change Directive from Owner, and thereafter submit to Owner and Architect as soon as possible any cost proposal required for approval.

§ 7.5.8 Construction Change Directive may be issued if change is to be made, but Contractor's proposal is not acceptable, or in order to expedite the change.

§ 7.6 CONTRACTOR’S REQUEST FOR CHANGES
§ 7.6.1 The Architect will review properly prepared, timely requests by the Contractor for changes in the Work, including adjustments to the Contract Sum or Contract Time. A request for a change in the Work shall be properly prepared, accompanied by the proposed cost, sufficient supporting data and information to permit the Architect to make a reasonable determination without extensive investigation to determine if the change is warranted or without the preparation of additional drawings or specifications. If the Architect

determines that requested changes in the Work are not materially different from the requirements of the Contract Documents, the Architect may issue an order for a minor change in the Work or recommend to the Owner that the requested change be denied

§ 7.6.2 If the Architect determines that implementation of the requested changes would result in a material change to the Contract that may cause an adjustment in the Contract Time or Contract Sum, the Architect may make a recommendation to the Owner, who may authorize further investigation or issuance of such change. Architect may incorporate those changes into a Change Proposal Request for the Owner's consideration

ARTICLE 8 TIME

§ 8.1 DEFINITIONS
§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract between the Owner and Contractor for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement or a written notice to proceed.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term “day” as used in the Contract Documents shall mean calendar day.

§ 8.2 PROGRESS AND COMPLETION
§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere or store materials or equipment on site prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by the Contract Documents or a notice to proceed given by the Owner, the Contractor shall notify the Owner in writing not less than five days or other agreed period before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

§ 8.2.3 The Contractor shall begin the Work in accordance with subparagraph 8.2.2 and shall proceed diligently and expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time. Once the Work is begun, it shall proceed without interruption unless specific interruptions are included in latest Project schedule approved by the Owner. The Work shall be adequately and continuously manned by Contractor staff throughout the Contract Time.

§ 8.2.4 Contractor, Subcontractors and their Subsubcontractors shall complete and coordinate Work in accordance with established schedule.

§ 8.2.5 Contractor is responsible for expediting Work, identifying potential conflicts and coordination problems, and proposing measures to avoid such problems.

§ 8.2.6 Whenever it becomes apparent that any activity completion date may not be met, Contractor shall take some or all of following actions and submit supplementary schedule indicating effect of action on progress and completion of Work, all without additional costs to Owner;

1. increase number of working hours per shift, shifts per working days, working days per week, or amount of construction equipment, or any combination of foregoing which will substantially eliminate backlog of Work, and put Project back on schedule, and/or,

2. increase construction manpower in such quantity as will substantially eliminate backlog of Work, and put Project back on schedule, and/or,
3. reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and put Project back on schedule.

§ 8.2.7 If Contractor fails to take any of the actions indicated in subparagraph 8.2.6 within three (3) days after receiving written notice, Owner may take action to attempt to put Project back on schedule, and deduct cost of such actions from money due or to become due Contractor, or shall be grounds for determination by Owner that Contractor is not prosecuting Work with such diligence as will insure completion within Contract Time. Upon such determination, Owner may terminate Contractor's right to proceed with Work, or any separable part thereof, in accordance with provisions of Article 14.

§ 8.2.8 Contractor shall bear cost of any services of Architect made necessary by delays in completion of Work due to actions or inactions of Contractor or any Subcontractors. Contractor shall promptly pay any such cost upon demand by Owner. At Owner's option, these costs may be deducted from any amounts otherwise due Contractor.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 Completion time stipulated under other sections of the Contract Documents may be extended by Change Order or Construction Change Directive to provide one additional work day for each full work day that the Contractor is prevented from working by reason by one or more of the following causes which impact the critical path of the Project Schedule:

1. Unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not limited to, catastrophes and/or acts of God, acts of another Contractor in the performance of a separate contract with the Owner, epidemics, quarantine restrictions, strikes or freight embargoes;
2. An unusual amount of severe weather to such an extent as to be definitely abnormal and beyond conditions that may be reasonably anticipated. For the purpose of this contract, a minimum of three (3) working days per calendar month shall be anticipated as “normally bad or severe weather”, and such time will not be considered justification for an extension of time.
3. Stoppage of work ordered by the Owner for reasons over which Contractor has no control.

§ 8.3.2 No claims for extension of time will be considered when based on delays caused by conditions existing at the time bids were received, and of which the Contractor might reasonably expect to have full knowledge at the time of bidding, or upon delays caused by failure on the part of the Contractor to anticipate properly the requirements of the work contracted for as to materials, labor, and equipment. All claims for extension of time shall be made in writing to the Architect with or prior to the next application for payment; otherwise they shall be waived.

§ 8.3.3 Completion date stipulated under other sections of Contract Documents may be extended by Change Order to compensate for additional work that may be ordered by Owner, provided such work is over and beyond the current scope of work Contractor, and is of such nature as to materially affect date of completion.

§ 8.3.4 Time extensions, when approved, will be granted with the understanding and agreement by all parties that no charges, beyond those approved at the time of the occurrence of the event causing the extension, will be assessed the Owner for overhead and profit by the Contractor. Belated extended overhead charges will not be considered.

§ 8.4 LIQUIDATED DAMAGES

§ 8.4.1 Time is of the essence for the Contractor’s performance of its obligations under this Agreement, and represents a material consideration for the Contract between the Owner and the Contractor.

The Contractor recognizes and agrees that the Owner will suffer financial loss if Substantial Completion of the Work is delayed. Both the Owner and the Contractor(s) recognize the delays, difficulties, and expense involved in proving, in a legal proceeding, the actual loss suffered by the Owner if the Work is not Substantially Complete by the Substantial Completion date. Accordingly, in lieu of requiring such proof, the Owner and Contractor agree that, as liquidated damages for delay, but not as a penalty, the Contractor will pay the Owner the sum of FIVE HUNDRED DOLLARS ($500.00) PER DAY for the first FOURTEEN (14) calendar days that Substantial Completion is delayed beyond the Substantial Completion date.

It is further agreed between the parties that should the Contractor delay in achieving Substantial Completion by more than FOURTEEN (14) calendar days, the liquidated damages set forth above would unfairly limit the recovery by the Owner and would not be a reasonable estimate of actual damages for such extended delay. Therefore, the parties agree that should the Contractor delay Substantial Completion by more than FOURTEEN (14) days, the Owner may recover liquidated damages in the amount of ONE THOUSAND DOLLARS ($1,000.00) for each calendar day that Substantial Completion is delayed after the initial FOURTEEN (14) calendar days of delay.

The Contractor will pay the cost of the Architect's services for delays beyond the Contract Time which shall be in addition to any liquidated damages.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor’s Applications for Payment.

§ 9.2.1 Application for Payments and Schedule of Values: See Division 1 for additional schedule of value requirements.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 Unless otherwise provided in the Contract documents: At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment for operations completed in accordance with the schedule of values. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage if provided for in the Contract Documents

§ 9.3.1.1 Such applications may not include requests for payment for portions of Work for which the Contractor does not intend to pay to a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.2 The Contractor’s Applications for Payment shall be made on AIA Form G-702 and the certification included thereon shall be executed and notarized. All pay applications shall be submitted with Contractor’s daily “Project Monitoring Logs” for the days corresponding with the period for with application for payment is made.

§ 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. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures

satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

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

§ 9.3.4 Application for Payments and Schedule of Values: See Division 1 for additional Application for Payment requirements.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment and the Architect's site visit, either issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Subparagraph 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site evaluations or inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents; or
.8 failure to comply with the approved Project construction schedule;
.9 erroneous estimates by the Contractor of the value of the work performed; or
.10 the existence of any event of default under the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.6 PROGRESS PAYMENTS
§ 9.6.1 Progress (monthly) payments will be made on account of 90 percent (90%) of the work done plus 90 percent (90%) of the material stored or stockpiled in an approved manner and location. However, when the value of completed work (excluding stored materials) reaches 50 percent (50%) or more of the current contract amount and provided satisfactory progress is being maintained on the Project, the Architect, upon request from Contractor with written consent of surety, may recommend to the Owner that the retainage be reduced to 5 percent (5%) of the value of work completed and materials stored on site. However, if the Contractor is granted the privilege of reduced retainage and thereafter falls behind for two successive months in his construction progress schedule, the original provisions for retainage shall automatically become effective the third month.

§ 9.6.1.1 Owner will make monthly partial payments to Contractor within 25 days after receipt of Certificate for Payment from Architect.

§ 9.6.1.2 Owner may withhold payment to Contractor notwithstanding Architect's certification, if it is necessary, in Owner's opinion, to do so to protect Owner from loss due to any of the reasons set forth in Subparagraphs 9.5.1.1 to 9.5.1.10, inclusive.

§ 9.6.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect on account of portions of the Work done by such Subcontractor.

§ 9.6.4 Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the

Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT
If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by mediation, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION
§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Work or designated portion thereof will not be considered to have achieved Substantial Completion until all systems are operational as designed; all life-safety components of the Work are complete; all designated or required governmental inspections or certifications have been made and posted including those by the State Division of Health and Human Services (DHSR), designated instructions of Owner's personnel in the operation of systems has been completed; and all final finishes are in place. The Owner's occupancy or use of the Work or a designated portion thereof under the provisions of Paragraph 9.9 shall in no way constitute the acceptance of the Work as Substantially Complete until the provisions of this Subparagraph 9.8.1 have been satisfied.

§ 9.8.2 Unless otherwise provided in the Contract Documents: When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall thoroughly inspect the work, and prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment and a written request for Architect's review of the work. 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 Unless otherwise provided in the Contract Documents: After receipt of the Contractor's Notice of Substantial Completion and the Contractor's list, the Architect and Owner will make inspections to determine whether the Work or designated portion thereof is substantially complete. If the Architect's and Owner's inspections 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 or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit another Contractor's Notice of Substantial Completion and a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.3.1 The Contractor's list shall include the following items; a) Request for Architect's Substantial Completion Inspection; b) Reports of the Contractor's inspections of every interior, exterior, and site element; c) Reports of all tests evidencing satisfactory function of every operable system as required; d) Reports on the instruction of the Owner's personnel in the use of operable systems and equipment including maintenance and operating information; e) Acceptance by each regulatory body having jurisdiction, including but not limited to NC Department of Health and Human Services, Division of Health Service Regulation; f) Certificate of Occupancy; g) List of items to be completed or corrected for each interior, exterior and site element, including operable systems and equipment; h) Operations and Maintenance Manuals; i) Test and Balance Reports; and j) All warranties.

§ 9.8.3.2 In the event that more than the two inspections by the Architect, described above are made necessary by the failure of the Contractor to complete the Work or to complete or correct items identified on the list of such items, the Contractor shall reimburse the Owner for all costs incurred including the cost of the Architect's services made necessary thereby.

§ 9.8.3.3 If the Contractor requests that the Architect prepare a list prior to Substantial Completion, or should the Contractor request a list be prepared to assist the Contractor in his completion and corrective work, or should the Architect be caused additional expense because of the Contractor's claim that work has been completed or corrected when it has not, then the Contractor shall reimburse the Owner for all additional costs incurred from the Architect for services provided by such request. The costs of such services will be withheld from payments then or thereafter due to the Contractor.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.8.6 Contract Closeout: See Division 1 for additional Substantial Completion requirements.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.6 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete or the Owner notifies the Contractor of intent to occupy or use a portion of the work prior to substantial completion, 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. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Unless otherwise provided in the Contract Documents: The Contractor shall inspect the work to determine that it is complete, is in accordance with the Contract Documents, and the Contract is fully performed. Upon receipt of the Contractor's Notice of Final Completion certifying that the Work is complete, is in accordance with the Contract Documents, that the Contract is fully performed,, that the

Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect and Owner will in a reasonable time make such inspection and, when the Architect and Owner finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's and Owner's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Unless otherwise provided in the Contract Documents: Neither a progress payment nor a final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in the forms designated by the Owner, and attached hereto as Exhibits 1A thru 1D. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.2.2 The Contractor shall submit closeout documents in accordance with Division 1 – General Requirements, prior to submitting final Application for Payment.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.3.1 Final payment constituting entire unpaid balance of Contract Amount will be paid by Owner to Contractor within thirty (30) days after final Certificate for Payment has been issued by Architect.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents, or
- **.4** faulty or defective Work appearing at or after final completion.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.10.5.1 Contract Closeout: See Division 1 for additional Final Completion and Final Payment requirements.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY AND HEALTH PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety and health precautions and programs in connection with the performance of the Contract. This requirement applies continuously and is not limited to normal working hours.

§ 10.1.1 The Architect's site responsibilities are limited solely to the activities of the Architect and the Architect's employees on site. These responsibilities shall not be inferred by any party to mean that the Architect has responsibility for site safety. Safety in, on, or about the site is the sole and exclusive responsibility of the Contractor alone. The Contractor's methods of work performance, superintendence of the Contractor's employees, and sequencing of construction are also the sole and exclusive responsibility of the Contractor alone.

§ 10.1.2 The Contractor agrees to waive any claim against the Owner and Owner's agents, architects, engineers, consultants, and their employees acting within the scope of their duties, and to defend, indemnify, and hold them harmless from any claim or liability for injury or loss that allegedly arises from the Contractor's performance of the Work described herein. The Contractor shall require all Subcontractors to conform with this provision before they start any work. Contractor shall insure this provision is in conformity with the insurance provision of this Contract.

§ 10.2 SAFETY AND HEALTH OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take precautions for safety and health of, and shall provide protection to prevent damage, injury or loss to

- **.1** employees on the Work and other persons who may be affected thereby, to include but not limited to the Owner and Architect, and their consultants and employees;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety and health of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety, health and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying Owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of hazardous materials or equipment or unusual methods are necessary for execution of the Work, such as driving or removal of piles, wrecking, demolition, excavation or other similar potentially dangerous work is necessary, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel and shall give Owner reasonable advance notice. Contractor is fully responsible for any and all damages, claims, and for the defense of all actions against Owner and Architect, and their consultants and employees resulting from the prosecution of such work.

§ 10.2.4.1 Use or storage of explosives is prohibited.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible, properly trained and qualified member or members of the Contractor's organization at the site whose duties shall be the prevention of accidents, damage to property, and to supervise and train personnel in the use of dangerous and hazardous equipment, materials and substances necessary for execution of the work. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not load or permit any part of the construction or site, including new construction or existing facilities to be loaded with weights that will exceed design loads so as to endanger safety of persons or property.

§ 10.2.8 Contractor shall give notice in writing at least 48 hours before breaking ground, to all persons having interests on or near site, Public Utility Companies, Owners of property having structures or improvements in proximity to site of the Work, agencies, authorities, inspectors, or those otherwise in charge of property, streets, water pipes, gas pipes, sewer pipes, telephone cables, electric cables, railroads or otherwise who may be affected by Contractor's operation, in order that they may remove any obstruction for which they are responsible and have representative on site to see that their property is properly protected. Such notice does not relieve Contractor of responsibility for any damages, claims, and defense of all actions against Owner and Architect resulting from performance of such Work in connection with or arising out of Contract.

§ 10.2.9 All parts of Work shall be braced to resist wind or other loads. Contractor shall perform Work with the explicit understanding that the design of the Project is based on all parts of Work having been completed and as such, the methods of performance of each part of Work shall be done accordingly.

§ 10.2.10 Temporary items such as, but not limited to scaffolding, staging, lifting and hoisting devices, shoring, excavation, barricades, and safety and construction procedures necessary in completion of Project shall be the responsibility of the Contractor and its Subcontractors and shall comply with all applicable codes and regulations. It shall not be responsibility of Owner, Architect or their representatives to determine if Contractor, Subcontractors or their representatives are in compliance with the aforementioned regulations.

§ 10.2.11 The Contractor shall comply with all Federal Occupational Safety and Health Administration Hazard Communications Act (HAZCOM) requirements, including properly maintaining Materials Safety Data Sheets (MSDS) at the Project site. The Contractor shall ensure that all MSDS are compiled in a single location at the Project site, and are available to the regulating agencies. The Contractor shall indemnify and hold the Owner and Architect harmless for their respective failure to comply with this provision.

§ 10.2.12 The Contractor shall be responsible for any fines, penalties or charges by any regulatory body by reason of any violation of safety or health regulations. Contractor shall also be responsible for reimbursement of any OSHA fines incurred by the Architect for Project site safety conditions created or controlled by the Contractor, that result in the Architect receiving a citation under the OSHA multi-employer citation provision.

§ 10.2.13 The Contractor shall notify Owner's and Architect's personnel upon arrival to the Project site of any known safety or health hazards at the Project, and the precautions they should take.

§ 10.2.14 The Contractor shall provide safety and health equipment (excluding boots) for the Owner and Architect to protect them from safety and health risks during the performance of their services during the construction of the Project.

§ 10.2.15 The Architect's review of Contractor's performance does not include review of adequacy of Contractor's safety or health measures.

§ 10.3 HAZARDOUS MATERIALS OR SUBSTANCES

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a hazardous material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner in writing, with a copy to the Architect.

§ 10.3.1.1 The term “hazardous materials or substance” also includes, but is not limited to asbestos, asbestos products, polychlorinated biphenyl (PCB), radon gas, industrial waste, acids, lead, alkaline, irritants, contaminants, or other pollutants, excluding mild chemicals used in the cleaning of finished building materials.

§ 10.3.2 The Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If the Contractor has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor has no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. The Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor’s reasonable additional costs of shut-down, delay and start-up, which adjustments shall be accomplished as provided in Article 7.

§ 10.3.2.1 The Work in the affected area shall be resumed immediately following the occurrence of any one of the following events: (1) the Owner causes remedial work to be performed which results in the absence of asbestos, polychlorinated biphenyl (PCB) or other hazardous materials or (2) the Owner and the Contractor, by written agreement, decide to resume performance of the Work, or (3) an appropriate governmental authority or environmental engineer certifies in writing that the Work may safely and lawfully proceed. In no event shall the Owner have any responsibility for any substance or material that is brought to the Project site by the Contractor, any subcontractor, any materialmen or supplier or any entity for whom any of them is responsible. The Contractor agrees not to use fill, products or other materials to be incorporated into the Work which may contain any asbestos, polychlorinated biphenyl (PCB) or other hazardous materials.

§ 10.3.3 The Architect and Architect's consultants and employees shall have no responsibility for the discovery, presence, handling, removal or disposal of or exposure of persons to hazardous materials or toxic substances in any form at the Project site.

§ 10.3.4 The Owner and Architect shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the Project site unless such materials or substances are required by the Contract Documents and the Contractor so notified the Owner and Architect. The Contractor shall notify the Owner and Architect prior to bringing any hazardous material or substance on to the Project site.

§ 10.3.5 If, without negligence on the part of the Contractor, the Contractor is held liable for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES
In an emergency affecting safety or health of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in paragraph 4.3 and Article 7.

§ 10.4.1 The Contractor shall promptly report in writing to Owner and Architect all accidents arising out of or in connection with the performance of the Work, whether on or off the site, which caused death, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately by telephone or messenger to Owner and Architect.

ARTICLE 11 INSURANCE AND BONDS
§ 11.1 CONTRACTOR'S LIABILITY INSURANCE
§ 11.1.1 The Contractor shall purchase and maintain in companies properly licensed to do business in the state in which the Project is located and acceptable to the Owner, such insurance as will protect him, the Owner, the Architect and their agents, representatives, and employees from claims set forth below which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by himself or by any Subcontractor or Subsubcontractor by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

1. claims under workers' or workmen's compensation, disability benefit and other similar employee benefit acts (with Workmen's Compensation and Employer's Liability Insurance in amounts not less than those necessary to meet the statutory requirements of the state(s) having jurisdiction over any portion of the Work);
2. claims for damages because of bodily injury, sickness or disease, or death of his employees; the Contractor will require his Subcontractors to similarly provide Workmen's Compensation Insurance for all of the latter's employees.
3. claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;
4. claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting there from;
6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle; and
7. claims for bodily injury or property damage arising out of completed operations.
8. Claims for losses, including bodily injury and property damage, covered by a Commercial General Liability policy.

The insurance shall be primary and noncontributing to any insurance possessed or procured by the Owner, and limits of liability shall be not less than those set forth herein or required by law, whichever is greater.

The insurance required shall have coverage limits of not less than the following:

<u>Worker's Compensation</u> including Occupational Disease and Employer's Insurance:

a. Statutory – Amounts and coverage as required by Law including any applicable provision for Voluntary Worker's Compensation benefits as required by Labor Union agreements and including the "All States" endorsement.
b. Employers Liability – At least $100,000 each accident.

Public Liability and Property Damage Insurance – The Contractor shall provide and maintain, during the life of the contract, Comprehensive General Liability Insurance, including coverage for Premises Operations, Independent Contractors, Completed Operations, Products and Contractual Exposures, as shall protect such Contractors from claims arising out of any bodily injury, including accidental death, as well as from claims for property damages which may arise from operations under this contract, whether such operations be by the Contractor or by any subcontractor, or by anyone directly or indirectly employed by either of them and the combined single limit of such insurance shall be $3,000,000.

Such coverage for completed operations must be maintained for at least two (2) years following final acceptance of the work performed under the contract.

Property Damages, including broad Form Property Damage and Explosion, Collapse, Underground property damage coverage, and blasting, where necessary.

Completed Operations Liability: Continuous coverage in force for one year after completion of Work.

Comprehensive Automobile Liability Insurance, including coverage for owned, non-owned and hired vehicles:

a. Bodily Injury Liability - $1,000,000 for each person and $1,000,000 for each accident.
b. Property Damage Liability - $1,000, 000 for each accident and $3,000,000 for the aggregate of operations.

§ 11.1.2 In addition to Contractual Liability including indemnification provision, Bodily Injury and Property Damage coverage under both comprehensive General and Comprehensive Automobile forms shall include “occurrence” basis wording, which means an event, or continuous or repeated exposure to condition which unexpectedly causes injury or damage during policy period.

§ 11.1.3 Contractor shall either (a) require each of its Subcontractors to procure and maintain during the life of its subcontract, Subcontractor Comprehensive General Liability, Automobile Liability, and Property Damage Liability Insurance of the type and in the same amounts as specified in this Subparagraph, or (b) insure the activities of its Subcontractors in its own policy.

§ 11.1.4 The insurance required by subparagraph 11.1.1 shall include contractual liability insurance applicable to the Contractor’s obligations under Paragraph 3.18.
§ 11.1.5 Certification of Insurance must be filed through the Architect by an insurer authorized to do business in the State in which the Project is located. All blanks and questions on Certificate must be filled out completely. Incomplete or inadequate Certificate will be returned to Contractor as unsatisfactory and commencement of its work will be delayed until satisfactory Certificate is submitted. Such delay will not warrant extension of contract time. These certificates shall contain a provision that coverage afforded under the policies will not be canceled until at least thirty days prior written notice has been given to the Owner.

§ 11.1.6 If excavation is required, Contractor shall obtain underground hazard coverage in addition to those shown above.

§ 11.1.7 If this insurance is written on Comprehensive General Liability policy form shall be AIA Document G705, Certificate of Insurance. If this insurance is written on a Commercial General Liability policy form, AIA Document G715 for ACCORD form 25S may be acceptable.

§ 11.2 OWNER'S LIABILITY INSURANCE
The Contractor shall be responsible for purchasing and maintaining complete Owner's protective liability insurance covering claims which may arise from operations under the Contract. The Contractor shall file a copy of all Owners' protective liability insurance policies with the Owner before any exposure to loss may occur. Limits shall be the same as specified for general liability and property damage insurance.

§ 11.3 PROPERTY INSURANCE
§ 11.3.1 The Owner shall be responsible for purchasing and maintaining Builders Risk property coverage upon the entire work at the site to the full insurable value thereof. Applicable deductibles shall be borne by the Owner. Owner will not be responsible for insuring any tools owned by mechanics, equipment, scaffolding, staging, towers and forms owned or rented by the Contractor, which are not intended to become part of the Project. The interest of the Contractor, subcontractors and sub-subcontractors in this insurance, if any, shall only be effective during the construction of the Project and all rights and interests of the Contractor, subcontractors and sub-subcontractors, if any, in this insurance shall end upon acceptance of the Project by the Owner.

§ 11.3.2 Any insured loss is to be adjusted with the Owner and made payable to the Owner as trustee for the insured's, as their interests may appear, subject to the requirements of any applicable mortgage clause.

§ 11.3.3 The Owner shall file a certificate of all policies with the Contractor before an exposure to loss may occur. If the Owner does not intend to purchase such insurance, he shall inform the Contractor in writing prior to commencement of the work. The Contractor then shall effect insurance which shall protect the interest of himself, is Subcontractors and the Sub-subcontractors in the work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure of the Owner to purchase or maintain such insurance and so notifies the Owner, then the Owner shall bear all reasonable cost appropriately attributable thereto.

§ 11.3.4 The Subcontractors or Sub-subcontractors and the Contractor shall remedy any defects due to such faulty materials or workmanship and pay for any damage to other Work resulting therefrom, which shall appear within a period of one year from the date of acceptance as defined in general conditions, and in accordance with the terms of any special guarantee provided in the Contract. The Owner shall give notice of observed defect within ninety (90) days of the time that they were observed or should have been observed.

§ 11.3.5 The Owner as trustee shall have the power to adjust and settle with the insurers.

§ 11.3.6 If the Owner finds it necessary to occupy or use a portion or portions of the work prior to substantial completion thereof, such occupancy shall not commence prior to a time mutually agreed to by the Owner and Contractor, which agreement shall not be unreasonably withheld, and before the consent of the insurance company or companies providing the property insurance. This insurance shall not be canceled or lapsed on account of such partial occupancy or use.

§ 11.3.7 Any wall or steel construction during this period of coverage must be properly braced, regardless of plans or specifications otherwise, to prevent damage from wind.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND
§ 11.4.1 The Contractor shall, prior to signing the Contract, furnish bonds covering the faithful performance of the Contract and the Payment of all obligations arising there under. Cost of Bonds shall be paid by the Contractor.

§ 11.4.2 The Contractor shall deliver the bonds to the Owner not later than the date of execution of the Contract, or if the Work is commenced prior thereto in response to a Notice to Proceed, the Contractor shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such Bonds will be issued.

§ 11.4.3 Amount shown on each bond shall be equal to 100 percent of the total amount payable by terms of the Contract. Surety shall be a company licensed to do business in the State in which the work is located and shall be acceptable to Owner. The surety shall have an "A" minimum rating of performance as stated in the most current publication of Best's Key Rating Guide, "Property Liability" which shall show a financial strength rating of a least five (5) times the Contract Price. Each bond shall be accompanied by a "Power of Attorney" authorizing the attorney-in-fact to bind the surety and certified to include the date of the Bond**.**

§ 11.4.4 Bonds shall be dated the same as or subsequent to the Contract, and accompanied by a current Power of Attorney. Bonds shall be furnished in sufficient number of copies so that one copy can be bound with each copy of the Agreement.

§ 11.4.5 Contractor shall keep Surety informed of progress of Work, and, where necessary, obtain surety's consent to, or waiver of: (1) notice of changes in the Work; (2) request for reduction or release of retention; (3) request for final payment; and (4) any other information required by surety.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK
§ 12.1 UNCOVERING OF WORK
§ 12.1.1 If a portion of the Work is covered contrary to the Architect's, Owner's or governing authority's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's, Owner's or governing authority examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect, Owner or governing authority has not specifically requested to examine prior to its being covered, the Architect, Owner or governing authority may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK
§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION
The Contractor shall promptly correct Work rejected by the Architect, Owner or governing authority or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION
§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK
If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Contractor shall bear all direct, indirect and consequential costs attributable to Owner's evaluation of and determination to accept such defective or nonconforming Work (such costs to include but not limited to fees and charges of architects, engineers, testing agencies, consultants, attorneys and other professionals). Such adjustment shall be effected whether or not final payment has been made. If any such acceptance occurs prior to final payment, Owner shall be entitled to an appropriate decrease in the Contract Sum. If the acceptance occurs after final payment, an appropriate amount will be paid by the Contractor to the Owner.

ARTICLE 13 MISCELLANEOUS PROVISIONS
§ 13.1 GOVERNING LAW
The Contract shall be governed by the law of the State of North Carolina without regard to any Conflict of Laws doctrine.

§ 13.2 SUCCESSORS AND ASSIGNS
§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project. In such event, the lender shall assume the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.2.3 Contractor shall not assign any monies due or to become due hereunder without written consent of Owner and of Contractor's Surety. File copy of consent of Surety, together with copy of assignment with Owner and Architect. In case Contractor assigns all or any part of any monies due or to become due under this Contract, instrument of assignment must contain clause substantially to effect that it is agreed that right of assignees in and to any monies due or to become due to Contractor shall be subject to prior liens and claims of all persons, firms and corporations for services rendered; for payment of all laborers and

mechanics for labor performed; for payment for all materials and equipment furnished and payment for all materials and equipment used or rented in performance of the Work called for in Contract; and for payment of any liens, claims, or amounts due to governments or any of their funds.

§ 13.3 WRITTEN NOTICE
Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.
§ 13.4 RIGHTS AND REMEDIES
§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available there under shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.
§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.
§ 13.4.3 Provided however, any statement herein or elsewhere in the Contract Documents, of the Architect's Standard of Care and Quality shall not alter the Architect's contractual obligations owed to the Owner

§ 13.5 TESTS AND INSPECTIONS
§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the testing agency, Project inspector (if any), public authorities, and (if requested) the Architect, timely notice of when and where tests and inspections are to be made so that they may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner, Project inspector (if any) or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Project inspector (if any) or Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the testing agency, Project inspector (if any), governing agency, and (if requested) the Architect of when and where tests and inspections are to be made so that they may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, laws, ordinances, rules or regulations, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect and Project inspector (if any).

§ 13.5.5 If the Architect, Owner or Project inspector (if any) is to observe tests, inspections or approvals required by the Contract Documents, they will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5.7 Tests and Inspections: See Division 1 for additional requirements

§ 13.6 Preconstruction Conference: After execution of the Agreement, a conference will be held for review and acceptance of the schedule referred to in Paragraph 3.10, to establish procedures for handling shop drawings and other submittals, for processing Applications for Payment, and to establish a general working relationship among the parties to the Work. The conference will be held at a time and place to be determined by the Owner. The conference will be attended by a representative of the Contractor, the major subcontractors and material suppliers, the Architect and the Owner.

§ 13.7 Contractor's Responsibility For Additional Architect Fees: If more than two submittals are required for any shop drawing or other submittal, the Contractor shall be liable for any Architect fees incurred as the result of such submittals. If the Contractor defaults and causes the Architect to provide additional services, the Contractor shall be responsible for same. If the Contractor submits an extensive number of claims and the majority of such claims are rejected, the Contractor shall be responsible for any additional Architect fees for any such rejected claims. Any funds due under this paragraph shall be deducted by the Owner from the amounts due the Contractor for such additional Architect fees and paid directly to the Architect.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents and a grace period of three (3) business days after written demand by the Contractor; or
- **.4** The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead and profit on the Work performed.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 disregards laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority having jurisdiction; or
.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, and the Owner believes that sufficient cause exists to justify such action, the Owner may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
.2 Accept assignment of subcontracts pursuant to Section 5.4; and
.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner within thirty (30) days after demand. This obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE
§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent;

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE
§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;
.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 ADDITIONAL PROVISIONS
§ 15.1 LEGISLATIVE/REGULATORY COMPLIANCE AND MODIFICATION
§ 15.1.1 The Contractor hereby agrees that it will comply with any and all statutes, laws, rules, regulations, licenses, certificates and authorizations of any governmental body or authority applicable to it in the

performance or carrying out of its obligations under this Agreement. The Owner hereby agrees that it will comply with any and all statutes, laws, rules, regulations, licenses, certificates and authorizations of any governmental body or authority applicable to it in the performance or carrying out of its obligations under this Agreement. Each party will obtain and maintain current and in force all licenses, certifications, authorizations and/or permits (and will pay fees therefore) necessary for it to carry out its duties and responsibilities under this Agreement.

§ 15.1.2 In the event any law, rule, regulation or payment policy, or any rule or policy of any non-governmental third-party payer, or any other federal, state or local law, rule, regulation, policy, or any interpretation thereof at any time during the term of this Agreement is modified, implemented, threatened to be implemented, or determined to prohibit, restrict or in any way materially change the method or amount of reimbursement or payment (a) for services under this Agreement, or (b) for services to patients of a party as a result of this Agreement, or by virtue of the existence of this Agreement has or shall have a materially adverse effect on the ability of either party to engage in any commercial activity on terms at least as favorable as those reasonably attributable as of the date hereof or by virtue of this Agreement place at risk the tax-exempt status of the Owner or the tax-exempt status of its financing vehicles (all of the foregoing being hereinafter collectively referred to as “Changes,” and individually, a “Change”), then the parties to this Agreement shall negotiate in good faith to amend this Agreement to preserve the economic expectations of the parties to the greatest extent possible in a manner consistent with any such Change. If this Agreement is not amended in writing prior to the effective date of the Change, then the party affected by the Change may terminate this Agreement upon thirty (30) days advance written notice. Upon such termination, neither party shall have any further rights hereunder, except those rights already accrued and those that expressly survive termination.

§ 15.2 OBRA COMPLIANCE
§ 15.2.1 The parties agree that upon request they will make their books, documents and records available to the Secretary of Health and Human Services, the comptroller general or their duly authorized representative to the extent required by Section 952 of the Omnibus Budget Reconciliation Act of 1980 and will obtain a similar agreement from any related sub-contractor whom they engage to perform on their behalf. This Section survives termination of this Agreement.

§ 15.3 INDEPENDENT CONTRACTOR
§ 15.3.1 This Agreement does not constitute the Contractor, its employees and agents as employees, agents or legal representatives of the Owner for any purpose whatsoever, it being the intent of the parties hereto to create the relationship with the Contractor, its employees and agents of an independent contractor for whose actions or failure to act, the Owner shall not be responsible. The parties shall not exercise control or direct the manner in which other parties perform their duties hereunder except to assure compliance with this Agreement. The parties further agree that the Contractor, its employees and agents are not eligible for any Owner employee benefits whatsoever and do not possess any rights or privileges as generally established for the Owner’s employees.

§ 15.4 CONFIDENTIAL INFORMATION
§ 15.4.1 In the course of the Work both the Contractor and the Owner may receive information, data, items and materials relating to each other’s personnel, business plans, methods and techniques, financing, financial condition, customers, lists, accounts, pricing, debts, assets, facilities and marketing, which we agree is Confidential Information. The Contractor and the Owner agree not to disclose the Confidential Information of the other party to any third party without express written consent either during the term of this Agreement or for two (2) years after its or expiration except as required by law.. Confidential Information does not include information that is (a) generally known in the industry in which the Contractor and the Owner compete; or (b) is readily ascertainable by proper means by competitors, through sources independent of either the Contractor or the Owner, or either party’s personnel, through no act or no fault of the Contractor or the Owner.

§ 15.5 COSTS
§ 15.5.1 Except as otherwise specifically provided herein, each party shall bear its own costs and expenses incurred in connection with the performance of its obligations hereunder.

§ 15.6 TAXES
§ 15.6.1 Each party shall be responsible for payment of any and all federal, state, local or other taxes which may arise or be imposed as the result of its performance under this Agreement or as the result of the receipt of any compensation or other funds under this Agreement or in connection with the transactions contemplated hereby, if any. This Section shall survive termination of this Agreement.

§ 15.7 INVALID PROVISION
§ 15.7.1 In the event than any portion of this Agreement shall be determined to be invalid or unenforceable, the remainder of this Agreement shall be deemed to continue to be binding upon the parties hereto in the same manner as if the invalid or unenforceable provision were not a part of this Agreement.

§ 15.8 NON-WAIVER
§ 15.8.1 No waiver of any term or condition of this Agreement by either party shall be deemed to be a continuing or further waiver of the same term of condition or a waiver of any other term or condition of this Agreement.

§ 15.9 COMPLIANCE WITH POLICIES AND PROCEDURES
§ 15.9.1 It is the responsibility of the Contractor to comply with, and to assure that its employees and agents comply with, all policies and procedures of the Owner, including but not limited to (and only when applicable), the Infection Control Policies, Occupational Health and Wellness, Blood-Borne Pathogens Policy (incorporated by reference) and the Substance Abuse Policy and Manual (incorporated by reference) and/or any subsequent changes to or revisions in these Policies and Procedures. Copies of these Policies and Procedures will be made available for review upon request by the Contractor. When applicable, it is also the responsibility of the Contractor to assure that its employees and agents comply with the Infectious Disease Control measures and requirements of the Owner, including but not limited to, current vaccinations and health screenings as required by the Infectious Disease Department of the Owner and to provide the Owner with a copy of current immunization records consistent with the Hospital's Occupational Health Department requirements.

§ 15.10 COOPERATION
§ 15.10.1 In the event of any litigation against either party pertaining to any matter related to the other parties duties under this Agreement, both parties agree reasonably to cooperate with the other during the pendency of the claim or lawsuit including, without limitation, providing the other with all available information concerning the claim or lawsuit and meeting with the other or its representatives prior to giving testimony in connection with such claim or lawsuit, unless such cooperation adversely affects the party or the party is counseled by its attorney not to do so in order to preserve the attorney-client or any other privilege.

§ 15.11 NON-DISCRIMINATION IN EMPLOYMENT
§ 15.11.1 Neither party shall discriminate because of race, color, religion, sex, age, national origin, disability, or status as a Vietnam veteran, as defined and prohibited by applicable law, in the recruitment, selection, training, utilization, promotion, termination or other employment-related activities concerning their employees. In addition, each party affirms that it is an equal opportunity employer and shall comply with all applicable federal, state and local laws and regulations.

END OF GENERAL CONDITIONS 00797

SECTION 00938 - REQUESTS FOR INFORMATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Specified This Section:

1. This Section specifies administrative and procedural requirements for handling requests for information (RFIs) during construction.

1.2 SUBMITTALS

A. Request For Information Submittal:

1. Submit each request (RFI) on the attached form and in accordance with procedures stipulated below.
2. Identify the issue, fabrication, or installation method in question in each request. Include related Specification Section and Drawing numbers. Provide complete documentation stating the issue. Include copies of Product Data, Drawings, descriptions of products, fabrication details, installation procedures or other information to help clarify the Contractor's request.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 CONDITIONS

A. Submit any such requests to the Architect as early as possible so as to cause no delay in the progress of the Work and enough in advance to allow the Architect reasonable and adequate time to provide a full and proper response. If the information being requested from the Architect can be reasonably determined by existing information contained within the Contract Documents then the Contractor shall reimburse the Architect for time spent researching the RFI at the Architect's current hourly rate.

3.2 ARCHITECT'S ACTION

A. After receipt of the request for information, the Architect may request additional information or documentation necessary for evaluation of the request. After receipt and review of all pertinent information and documentation, the Architect will issue his response. Such response may be in written form or drawings as the Architect shall determine.

00938 - REQUEST FOR INFORMATION

REQUEST FOR INFORMATION	**Date**:
Attention:	**Submitted By:**
The East Group 4325 Lake Boone Trail, #311 Raleigh, NC 27607	**RFI # _____.**
Subject:	
INFORMATION REQUESTED Drawing and detail reference: Specification section and paragraph:	
Signed: _____ Contractor's Authorized Representative hereby certifies that he has preplanned all Work as per General Conditions Article 3.2 and his request is being submitted as to cause no delay in the progress of the Work.	
RESPONSE	

Answered By: _____ Date: _____

END OF SECTION 00938

SECTION 01026 – UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

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

B. Unit Price is an amount proposed by bidders, stated on Bid Form, as a price per unit of measurement for materials or services added to or deducted from contract Sum by appropriate modification, if estimated quantities of Work required by Contract Documents are increased or decreased.

C. Owner will confirm in field the Contractor's measurement of work-in-place that involves use of established unit prices. If disputes arise, Owner reserves the right to have this work measured, at Owner's expense, by an independent surveyor acceptable to Owner.

1.2 DESCRIPTION

A. Work includes:

1. Overhead and profit in Unit Price.
2. Indicate Unit Price on Bid Form.
3. Unit Price indicated on Bid Form will be made part of Contract.

1.3 UNIT PRICE

A. Unit Price No. 1: Additive cost for Contractor's General Conditions, overhead plus profit, per day for Stop Work Notice issued by Owner for a duration greater than 4 hours.

END OF SECTION 01026

SECTION 01110 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE OF WORK

This project will provide minor renovations to refresh finishes and patient experience in the labor and delivery unit of the hospital.

1.2 SINGLE PRIME CONTRACT

A. These documents form the Contract Documents for the Contract with the Owner as follows:

1. The Agreement;
2. The Pre-Bid Meeting Minutes;
3. The Addenda;
4. The General Conditions of the Contract;
5. Technical Specifications Divisions 1 thru 16;
6. Drawings;
   a) Cover Sheet;
   b) G series sheets;
   c) A series sheets;
   d) I series sheets;
   e) F series sheets;
   f) P series sheets;
   g) M series sheets;
   h) E series sheets.

1.3 CONSTRUCTION SEQUENCE

A. It is recognized that this project will tend to disrupt operations of the existing facility; however, certain vital operations and services now in the construction area cannot be terminated or disrupted. Therefore, relocation of these operations and services must be accomplished in a certain planned sequence so as to allow continuous operation of these services.

B. The following description explains these steps and this sequence must be adhered to by all Contractors.

1.4 PHASING PLAN

The Work for this project is to be completed in **multiple phases.** Specific sequence of work needs to be coordinated with the Owner. The Owner is to have final approval of the scheduled work tasks so as to minimize the disruption caused by the construction of this project to the ongoing operations of the Hospital.

1.5 CONTRACTOR'S USE OF PREMISES

A. General:

1. Confine operations to areas within Contract limits indicated. Portions of the site beyond these limits shall not be disturbed.

B. Keep driveways and entrances serving the premises clear and available to the Owner at all times.

C. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

D. Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations immediately. Take all precautions necessary to protect the building and its occupants during the construction period.

1.6 OWNER OCCUPANCY:

A. Full Owner Occupancy:

1. The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Schedule and perform the Work so as not to interfere with the Owner's operations.

B. Phased Partial Owner Occupancy:

1. The Owner will partially occupy portions of the project and may place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Partial occupancy shall be scheduled according to the project phases listed above. Such partial occupancy and placing of equipment shall not constitute acceptance of the Work.

C. A Certificate of Substantial Completion will be executed for each specific phase of the Work. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.

D. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been completed. Upon partial occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

1.7 OWNER-FURNISHED ITEMS

A. The Contractor is responsible for designating the delivery dates of Owner-furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Owner-furnished items at the site. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements, and to repair or replace items damaged as a result of his operations. The Contractor is responsible for installation of these items unless otherwise indicated.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01110

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included in This Section:

1. This section specifies administrative and procedural requirements governing handling and processing of allowances.
2. Selected materials and equipment are included in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct. Additional requirements, if necessary, will be issued by Change Order.
3. Unless otherwise provided in the Contract Documents all allowances:
   a) shall be selected by the Owner
   b) shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
4. Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum and not in the allowances;

1.2 SUBMITTALS

A. Submit proposals for purchase of products or systems included in Allowances in the form of a Change Proposal Request (CPR).

B. Submit invoices and/or delivery slips to substantiate actual quantities of materials delivered to the job site for use in fulfillment of the Allowance.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate materials and installation for each allowance item with related materials and installations to ensure that each allowance item is integrated with related construction activities.

3.2 SCHEDULE OF ALLOWANCES

A. **ALLOWANCE NO. 1:** Include a $2,500 allowance for materials and labor to repair and or bring up to current code requirements, existing mechanical, electrical, plumbing and fire protection elements located within project area.

B. **ALLOWANCE NO. 2:** Include a $2,500 allowance for materials and labor to repair the existing fire rated assemblies. This work may include gypsum board work, spray on fireproofing, or fire caulking.

END OF SECTION 01210

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included This Section:

1. This section specifies administrative and procedural requirements for Alternates.

1.2 DEFINITION:

A. An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the Bidding Requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 COORDINATION:

A. Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.

1.4 SCHEDULE:

A. A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements necessary to achieve the Work described under each Alternate.

B. Include as part of each Alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. ALTERNATE NO. 1: ADD the work associated to replace the lighting at the nurses' station as indicated on the Contract Documents.

END OF SECTION 01230

SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included In This Section:

1. This section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.2 CHANGE PROPOSAL REQUESTS (CPR)

A. Prior to incorporation in a Change Proposal Request each proposed change in the Work, adjustment to the Contract Sum, or adjustment to the Contract Time will be identified as a Change Proposal Request (CPR) each of which will be assigned a number by the Architect.

B. Change Proposal Requests are for pricing and can be used to make minor changes in the work without invalidating the Contract.

C. Proposals shall be submitted to the Architect within 10 days of receipt by the Contractor of a Change Proposal Request; shall be complete in all respects; shall show the proposed effect on both the Contract Sum and the Contract Time; and shall not be withdrawn or modified by the Contractor for 30 days following submittal. Proposals shall be based on costs necessarily incurred by the Contractor in the proper performance of the Work. Such costs shall be at rates not higher than the standard paid at the place of the Project except with prior consent of the Owner. Proposals shall include only those items set forth below:

1. Wages of construction workers directly employed by the Contractor to perform the construction of the Work, including welfare, unemployment compensation, social security and other benefits.
2. Costs, including transportation, of materials and equipment incorporated or to be incorporated in the completed construction. All discounts for cash or prompt payment shall accrue to the Contractor.
3. Payments made by the Contractor to Subcontractors in accordance with the requirements of the subcontracts.
4. Cost of all materials, temporary facilities, equipment and hand tools not customarily owned by the construction workers, which are provided by the Contractor at the site and fully consumed in the performance of the Work.
5. Reasonable rental costs for necessary temporary facilities, machinery, equipment, and hand tools used at the site of the Work, whether rented from the Contractor or others. Rates and quantities of equipment rented shall be subject to the Owner's prior approval. That portion directly attributable to this Contract of premiums for performance bonds.
6. Losses and expenses not compensated by insurance or otherwise, sustained by the Contractor in connection with the Work, provided they have resulted from causes other than the fault or neglect of the Contractor.
7. Costs of removal of debris from the site.
8. Costs incurred in taking action to prevent threatened damage, injury or loss in case of an emergency affecting the safety of persons and property.
9. Other costs incurred in the performance of the Work if and to the extent approved in advance in writing by the Owner.

D. Proposals shall not include:

1. Salaries and other compensation of the Contractor's personnel stationed at the Contractor's principal office or offices.
2. Expenses of the Contractor's principal office and offices other than the site office.
3. Overhead and general expenses.
4. The Contractor's capital expenses, including interest on the Contractor's capital employed for the Work.
5. Rental costs of machinery and equipment, except as specifically provided in allowance for overhead and profit scheduled below.
6. Costs due to the fault or negligence of the Contractor, Subcontractors, anyone directly or indirectly employed by any of them, or for whose acts any of them may be liable, including, but not limited to, costs for the correction of damaged, defective or nonconforming Work, disposal and replacement of materials and equipment incorrectly ordered or supplied, and making good damage to property not forming part of the Work.
7. Any cost not specifically and expressly described in items 1 through 6 above.

1.3 CHANGE PROPOSAL REQUEST PROCEDURES

A. Upon approval and execution by the Owner of a Change Proposal Request (CPR) and the Contractor's associated proposal the Contractor shall promptly proceed with the change in the Work involved. An approved Change Proposal Request (CPR) and the Contractor's associated proposal shall be considered the full amount of compensation, or credit, for the work involved, omitted, or substituted and no additional claims may be made regarding this item.

B. At the time of signing a Change Proposal Request, the Contractor shall notify his Surety that the Contract Sum has been changed by the amount of this Change Proposal Request and he shall furnish his Surety with a copy of the approved Change Proposal Request.

C. Change Proposal Request Format:
1. Use the format included at the end of this Section for submittal of CPR's .

PART 2 - **PRODUCTS** (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

SEE FORMAT NEXT PAGE

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

CHANGE PROPOSAL REQUEST SUMMARY

(a)	Materials (Provide itemized breakdown)	$ _____	
(b)	Rent of Equipment (list Separately) At rates not in excess of those prevailing in locality of the project.	$ _____	
	Sub-Total (1) [a + b]		**$ _____**
(c)	Overhead & Profit (10% x Subtotal (1) for additive changes, 0% for deductive changes.)	$ _____	
	Sub-Total (2) [Subtotal 1 + c]		**$ _____**
(d)	Labor (Provide itemized breakdown)	$ _____	
(e)	Overhead & Profit (10% x Labor item (d) for additive changes, 0% for deductive changes.)	$ _____	
	Sub-Total (3) [d + e]		**$ _____**
(f)	Sub-Contract Work (if applicable, same breakdown as shown above.)	$ _____	
(g)	Contractor's Overhead and Profit on Sub-Cost (5% for additive changes, 0% for deductive changes.)	$ _____	
	Sub-Total (4) [f + g]		**$ _____**
(h)	Insurance (Workmen's Compensation, Social Security or as otherwise required and/or specified.)	$ _____	
	Sub-Total (5) [Based on d]		**$ _____**
(i)	Guarantee Bond (on Sub-Total (2) + Sub-Total (3) or Sub-Total 4 as applicable)		**$ _____**
	Total		**$ _____**

Extension of Time Requested: _____ calendar days.*

* Attach detailed justification.

END OF SECTION 01250

SECTION 01290 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Work Specified In This Section

1. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

1.2 SCHEDULE OF VALUES

A. The Schedule of Values shall be submitted on AIA-G702 and G703 forms and shall be in sufficient detail to show the work of each section of the Specifications and each line item shall further include a separate listing for Total Cost of Labor and Total Cost for Materials and Equipment.

B. The Contractor(s) shall submit such data as may be required by the Architect to establish the reasonableness of the value assigned to the labor and/or materials for each line item.

C. The following minimum items in addition to the above shall be required:

1. Pre-construction Cost:
   a) Building permits and fees.
   b) Bonds
   c) Mobilization.
2. On site General Conditions:
   a) Job Site Superintendent and supervisory staff.
   b) Office and Storage Trailers.
   c) Utilities.
   d) Clean-up, dumpster, etc.
3. Project Close Out Requirements.
4. Home Office Overhead and Profit.

D. In phased projects, the Schedule of Values shall be so arranged that each phase of the project is scheduled separately with line items for each of the various portions of the Work which constitute that phase. For each item, the Schedule of Values shall show separate line items for labor and materials. Along with separate line items for labor and materials; provide line items per each floor of each phase as directed by the Architect.

E. At the time of submitting the Schedule of Values, the Contractor shall also submit an estimate of the amount of each Request for Payment for the Owner's use in planning cash flow for the Project. It is understood that actual amounts requested by the Requests for Payment may not agree with this estimate.

1.3 APPLICATIONS FOR PAYMENT

A. Unless otherwise agreed between the Owner and Contractor, the Contractor shall submit his requests for payment not later than the twenty-fifth day of each month. Requests shall be based on work performed during the period ending with the date of the request.

B. The Owner will make a partial payment to the Contractor based on Contractor's requests duly certified, notarized and approved by the Architect by the twenty-fifth of the following month.

C. Until Substantial Completion, the Owner will pay ninety percent (90%) of the amount due the Contractor on account of progress payments.

D. Upon Substantial Completion the Owner will continue to hold full amount of retainage until the Contractor achieves final completion.

E. Each Request for Payment shall be accompanied by:

1. Written consent of the Contractor's Surety.
2. Such consent shall state that Surety agrees to payment of the sum requested, that the value of the work stated in the Contractor's request is a true statement, and that the sums requested for stored materials (if any) are correct.
3. Provide Certified Sales Tax Report. (section 01291).
4. Coordination Drawings shall be submitted by the second Application for Payment. (if applicable to project).
5. A monthly up-dated schedule signed by general contractor.
6. Lien waivers.
7. Previous Month's Project Monitoring Log.
8. Proof of Payment Certification form (in accordance with section 00102).

1.4 STORED MATERIALS

A. In requesting payment for materials stored on or off the site, the Contractor shall submit with his Application for Payment the following:

1. An itemized list of the stored material prepared in sufficient detail to identify the materials and their value.
2. Evidence such as bills of sale or such other proof as may be requested by the Owner or Architect to substantiate that the materials listed have been paid for by the Contractor, or for materials stored at the site only, a notarized statement from the materials supplier stating that the materials will become the property of the Owner upon payment by the Owner to the Contractor.
3. In addition for material stored off the site, the Contractor shall submit with his Application for Payment the following:
   a) Evidence that the materials are stored at the location previously agreed to in writing as provided by Subparagraph 9.3.2 of the General Conditions. No payment will be made for material stored off the site until the storage location has been agreed upon in writing.
   b) Evidence that the storage location is bonded.
   c) Evidence that the materials are insured while in storage and while in transit to the site.
   d) Evidence that transportation to the site will be provided.
4. The materials may be reviewed in their storage location by the Architect. This review, if performed, is an extra service for which the Owner shall pay the Architect and for which the Owner shall be reimbursed by the Contractor by Change Order.

1.5 PROGRESS PAYMENTS

A. Provide with each Application for Payment, notarized waivers of lien from all subcontractors and material suppliers and if requested by the Owner:

1. the Contractor's sworn statement showing names and addresses of all subcontractors furnishing materials or labor and the amounts due or to become due each;

2. the Contractor's sworn statement showing the names and addresses of all material suppliers furnishing materials or labor and the amounts due or to become due or to become due each; and
3. a sworn statement from each subcontractor showing names and addresses of all persons furnishing materials or labor and the amounts due or to become due each.

1.6 FINAL PAYMENT

A. At the completion of the Project prior to receiving final payment, the Contractor shall furnish the Owner, through the Architect, properly signed and notarized waivers of lien from all subcontractors employed and material suppliers furnishing materials for the Project. Such waivers shall be submitted before final payment will be processed to the Owner by the Architect.

B. Administrative actions and submittals that shall proceed or coincide with this application include:

1. Notarized final waiver of lien.
2. Occupancy permits and similar approvals.
3. Warranties (guarantees) and maintenance agreements.
4. Final test/adjust/balance records.
5. Final medical gas certificates
6. Maintenance instructions.
7. Start-up performance reports.
8. Final cleaning.
9. Consent of Surety.
10. Verification of continued insurance.
11. Completion of Project closeout requirements.
12. Completion of items specified for completion after Substantial Completion.
13. Assurance that unsettled claims will be settled prior to payment.
14. Assurance that Work not complete and accepted will be completed without delay.
15. Transmittal of required Project construction records to Owner.
16. Certified property survey (if required).
17. Proof that taxes, fees and similar obligations have been paid.
18. Removal of temporary facilities and services.
19. Removal of surplus materials, rubbish and similar elements.
20. Change of door locks to Owner's access.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01290

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

NORTH CAROLINA SALES TAX REPORT

PROJECT NO.: _____ PROJECT LOCATION: _____
PROJECT NAME: _____ PERIOD ENDING: _____
CONTRACTOR: _____

Invoice #	Name of Supplier/Subcontractor	County in which taxes where paid	State	County	TAX TOTAL
		TOTAL	**$**	**$**	**$**

_____
Contractor's Signature

_____
(Title)

_____
(Date)

SECTION 01310 - PROJECT COORDINATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Specified In This Section:

1. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
   a) Coordination.
   b) Administrative and supervisory personnel.

1.2 COORDINATION

A. The Contractor shall:

1. Schedule the work of all sub-contractors; maintain a progress schedule for all sub-contractors for this project; notify the Architect of any changes in the progress schedule; and be responsible for providing adequate notice to all sub-contractors to insure efficient continuity of all phases of the project work.
2. Hold meetings with the various major sub-contractors as required to coordinate work and provide work progress reports.
3. The Contractor shall provide for scheduling of all testing as required by this contract. Such testing for each item shall be indicated on the construction schedule.
4. The Contractor shall coordinate the securing of all final certificates of inspection, the Certificate of Occupancy, and other inspections that may be required by authorities having jurisdiction over the Work. He shall deliver same to the Architect upon completion of the Work.

1.3 COORDINATION DRAWINGS:

A. Coordination Drawings shall be prepared, and submitted to the Architect, indicating structural steel and other miscellaneous steel, General, HVAC, Plumbing, Fire Protection, and Electrical work which must be carefully coordinated by all trades to minimize space conflicts. These drawings shall be prepared prior to any trade starting work, which is in close proximity to work of any other trade(s).

B. ONLY the Architect's electronic files of the base floor plans and the base reflected ceiling plans will be available to the Contractor for the preparation of the coordination drawings.

C. Additional coordination drawings as required by other specification sections shall be prepared by the Contractor and reviewed as required.

D. The Contractor shall be responsible for the preparation and submission of the coordination drawings. Specific efforts required by the Contractor include:

1. Initiation of the drawings including furnishing of reproducible sheets which show Floor Plans with structural components, miscellaneous steel and reflected ceiling heights and elements.
2. Coordination/communication with other trades during the preparation of the coordination drawings.
3. Minimizing future conflicts between trades.

E. Each Trade Contractor shall be responsible for showing the elements of their work on the coordination drawings. Each Trade Contractor is only responsible for showing elements relative to his work and the overall coordination of the production of the coordination drawings and resolution of conflicts. These coordination drawings shall represent a collective effort by all Trade Contractors to avoid space conflicts and expedite the work of all trades. Work shall not proceed until the coordination drawings have been submitted to Architect.

F. Sequence of production of the coordination drawings shall be as follows:

1. General work (structural components, ceiling heights, walls and soffits etc.).
2. Electrical fixtures.
3. HVAC work.
4. Plumbing work.
5. Fire Protection work.
6. Electrical conduit
7. General work (other than #1 above).

G. Prepare coordination drawings to a scale of 1/4" =1'0" or larger; detailing major elements, components, and systems of HVAC, plumbing, fire protection and electrical equipment and materials in relationship with other systems, installations, building structural steel and components. Dimension elements and components of the systems from column lines and indicate elevations of elements and components relative to the finished floor. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work. General trade to indicate location of all walls (rated and non-rated), blocking locations, and all recessed wall items, etc. At minimum, the coordination drawings shall include (but not necessarily be limited to) the following:

1. All structural and miscellaneous steel.
2. Indicate the proposed location of all ductwork and air distribution equipment including terminal units and diffusers.
3. Indicate the proposed location of piping services including:
   a) Domestic hot and cold water piping.
   b) Waste and vent piping.
   c) Roof drain/rain leader piping.
   d) Medical gas piping.
   e) Sprinkler piping and sprinkler heads.
4. Indicate the proposed location of electrical conduits and all light fixtures.
5. Indicate clearances for installing and maintaining insulation.
6. Indicate clearances for servicing and maintaining equipment, filter removal, and space for equipment disassembly required for periodic maintenance.
7. Indicate major equipment, equipment support details, and connections.
8. Indicate sizes and locations of required concrete housekeeping pads and bases.
9. Indicate all fire-rated walls and partitions.
10. Indicate location of all recessed wall items, i.e. toilet accessories, fire extinguisher cabinets etc.
11. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
12. Prepare separate floor plans, sections, and details as required to indicate all piping and conduits routed through wood truss openings.
13. Prepare separate reflected ceiling plans to coordinate and integrate installations of air outlets and inlets, light fixtures, communication systems components, sprinkler heads, and other ceiling-mounted items.
14. It is not required (unless otherwise noted above) to indicate conduit 1-1/4" in diameter and smaller on the coordination drawings. However, the respective trade installing such elements assumes responsibility for coordinating and installing said elements in a manner that does not conflict with other elements shown on the coordination drawings.

H. Upon completion of the coordination drawings, the Contractors and major Subcontractor shall be required to sign each sheet of the coordination drawings. Signature shall attest to a diligent review and agreement to alleviate future space conflicts at no cost to the Owner.

If any Trade Contractor installs elements of his work in locations other than those indicated on the coordination drawings which impacts the work of other Trade Contractors, or installs elements of his work which are not shown on the coordination drawings which impacts the work of other Trade Contractors whose elements are shown on the coordination drawings, the Trade Contractor in violation of the coordination drawings shall be required to either:

1. Move his work to resolve the conflict, or
2. Reimburse the affected Contractor to move his work to resolve the conflict, or
3. Reimburse the Owner to move his work to resolve the conflict.

I. Drawings must be complete and submitted to the Architect within 90 days after award of contract for record only. The third Application for Payment will not be processed until the coordination drawings are received by the Architect. No review or approval will be forthcoming. Coordination drawings are required for the benefit of all Trade Contractors as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

J. Coordination drawings shall be revised and re-coordinated by all trades for any major CPR which causes a change to the reflected ceiling plan or changes to ductwork, piping, fire protection or electrical drawings. The cost of these revisions is to be included as a line item in the CPR pricing.

1.4 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General:

1. The Contractor shall appoint a single representative, i.e. Project Manager, to be the single contact person with the Owner and/or Architect. The Project Manager shall have experience on at least two projects of similar scope, size and complexity.
2. The Contractor shall be responsible for supervising and expediting the project work with a full time on-site job superintendent. Said individual shall be on-site at all times when work is in progress. Said individual shall be a full time employee of the Contractor, not a subcontract consultant, neither consultant nor contract employee.
3. In addition to the Project superintendent, the Contractor shall give his superintendent enough support staff that his ongoing presence can be maintained on site so that errands to secure materials etc. will be carried out by others and others will receive deliveries to site.
4. The on site project superintendent shall have a minimum of five (5) years experience in Hospital and Acute Care facilities construction.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01310

SECTION 01315 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included This Section:

1. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
   a) Pre-Construction Conference.
   b) Coordination Meetings.
   c) Progress Meetings.

1.2 PRE-CONSTRUCTION CONFERENCE

A. A pre-construction conference shall be scheduled by the Architect and held at the Project site or other convenient location after execution of the Agreement or Notice To Proceed, whichever comes first and prior to commencement of construction activities.

B. Attendees:

1. The Owner, Architect, the Contractor(s) and its superintendent(s) shall each be represented at the conference by persons authorized to conclude matters relating to the Work.

C. Agenda:

1. Discuss items of significance that could affect progress including such topics as:
   a) Work sequencing.
   b) Tentative construction schedule.
   c) Designation of responsible personnel.
   d) Procedures for processing Change Proposal Requests and Change orders.
   e) Procedures for processing Applications for Payment.
   f) Submittal of Shop Drawings, Product Data and Samples.
   g) Preparation of record documents.
   h) Use of the premises.
   i) Staging areas.
   j) Security.
   k) Housekeeping.

1.3 COORDINATION MEETINGS

A. The General Contractor shall conduct project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special Pre-installation meetings.

B. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting, such as the Owner and Architect.

C. Weekly Progress Meetings:

1. To enable orderly review of progress during construction and to provide for systematic discussion of problems, weekly project meetings shall be held throughout the construction period.
2. Persons designated by each Subcontractor shall attend and participate in weekly project meetings shall have all required authority to commit the Contractor or Subcontractor to decisions agreed upon in the project meetings.
3. The General Contractor shall conduct the meetings, compile minutes of each meeting and will distribute copies to the Owner and the Architect. The General Contractor shall distribute such other copies as he wishes. Each Contractor shall, to the maximum extent practicable, assign the same person or persons to represent the Contractor or Subcontractor at project meetings throughout the construction period.

D. Owner, Architect, Contractor (OAC) Project Meetings:

1. To enable orderly review of progress during construction and to provide for systematic discussion of problems, project meetings shall be held throughout the construction period at intervals determined prior to construction.
2. The General Contractor shall attend and participate in the OAC project meetings and shall have all required authority to commit the Contractor and Subcontractor(s) to decisions agreed upon in the project meetings.
3. The Architect will conduct the OAC meetings and compile minutes of each meeting and will distribute copies to the Owner and Contractor. The Contractor shall distribute such other copies as required. The General Contractor shall, to the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout the construction period.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01315

SECTION 01325 - PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Specified In This Section:

1. This Section specifies administrative and procedural requirements for the progress schedules and reporting progress of the Work.
2. Refer to General Conditions and the Agreement, for definitions and specific dates of Contract Time.

1.2 QUALITY ASSURANCE

A. General:

1. The General Contractor shall provide the progress scheduling services, including planning, evaluating and reporting.
2. The Contractor shall deliver the schedules to the Architect within 48 hours of request.

1.3 PROGRESS SCHEDULE

A. CPM Schedule:

1. Immediately following Contract Award, the General Contractor shall hold a meeting for the purpose of establishing and preparing a Construction Progress Schedule.
   a) Each major subcontractor shall be represented.
2. The Contractor shall develop a schedule demonstrating fulfillment of the contract requirements, shall keep the network up-to-date in accordance with the requirements of the contract and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of Prime contractors, subcontractors, equipment vendors and suppliers).
3. Conventional Critical Path Method (CPM) Precedence Diagramming Method (PDM) technique will be utilized to satisfy time applications.
4. The Construction Progress Schedule, utilizing a critical path method of scheduling, shall be detailed to a degree, which will permit proper and complete coordination of all trades in each portion of the work.

B. Network Diagram Requirements:

1. Show on the network diagram the sequence and interdependence of work activities/events required for complete performance of all items of work.
2. In preparing the network diagram, the Contractor shall:
   a) Exercise sufficient care to produce a clear, legible and accurate network diagram.
3. Show the following on each work activity/event:
   a) Activity/Event ID numbers.
   b) Concise description of the work represented by the activity/event.
   c) Duration (in work days.)
   d) Manpower required (average number of men per day if requested).
4. Show activities/events as:
   a) Contractor's time required for submittal of shop drawings.
   b) Architect-Engineer's review and approval of shop drawings.

   c) Interruption of utilities, delivery of Owner furnished equipment, project phasing and any other specification requirements.
5. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.
6. Therefore, the schedule shall specifically indicate the following dates:
   a) List of testing requirements for all Specification Sections required by the Contractor's CQC Plan.
   b) Updating of schedule for all non-compliance testing.
   c) The date of satisfactory enclosure.
   d) Dates scheduled for delivery of major items of equipment.
   e) Dates scheduled for completion of installation of major items of equipment.
   f) The anticipated date of Substantial Completion for each phase of construction Owner training.
   g) Dates scheduled for owner occupation of completed phased areas and dates for moving of owner's equipment into said areas.
   h) Project closeout, as established by the Contract.
   i) The date of Final Completion of the project, as established by the Contract.
7. Submit the following supporting data in addition to the network diagram:
   a) The proposed number of working days per week.
   b) The holidays to be observed during the life of the contract (by day, month, and year).
   c) The planned number of shifts per day.
   d) The number of hours per shift.

C. Post original and current copy of the schedule in the Project Coordinator's field office.

D. Phasing:

1. Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by Contractor and partial occupancy by the Owner prior to Substantial Completion.

E. Schedule Updating:

1. Revise the schedule after each meeting or activity, where revisions have been recognized or made including approved CPR's.
2. Issue the updated schedule concurrently with report of each meeting.

F. Format:

1. Display the full network on stable transparency, or other reproducible media, of sufficient width to show data clearly for the entire construction period.
   a) Provide three (3) complete color schedules to the Architect.
   b) Provide complete color schedule in the Project Coordinator's trailer.
2. Mark the critical path in red.
3. Locate the critical path near the center of the network
4. Sub networks on separate sheets are permissible for activities clearly off the critical path.

G. The completed Construction Progress Schedule bearing the approval signature of the Contractor and major subcontractors shall be distributed to all interested parties in quantities as required within 60 days of the Notice to Proceed.

H. At the time of submitting the Construction Progress Schedule to the Architect, the Contractor shall also submit the anticipated amount of each monthly payment that will become due in accordance with the Progress Schedule.

1. When the Contractor fails or refuses to furnish formation and the associated updated schedule data, which, in the sole judgment of the Owner and Architect, is necessary for processing the monthly progress payment, the Contractor shall not be deemed to have provided supporting schedule data upon which progress payment may be made.

1.4 PROGRESS REPORTING

A. Job progress will be reviewed to verify:

1. Actual start and/or finish dates for updated/completed activities/events.
2. Remaining duration, required to complete each activity/event started, or scheduled to start, but not completed.
3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the network diagram and computer-produced schedules.
4. Percentage for completed and partially completed activities/events.
5. Activity/event duration and percent complete shall be updated independently.

1.5 RESPONSIBILITY FOR COMPLETION

A. Whenever it becomes apparent from the current monthly progress review meeting that phasing or contract completion dates will not be met, the Contractor(s) shall execute some or all of the remedial actions stipulated in the General Conditions, Section 00797.

B. CPM revisions made under this paragraph which affect the previously approved computer-produced schedules for Owner furnished equipment, must be furnished in writing to the Owner for approval.

1. Any service charges, i.e. additional fees associated with the revisions including storage, redelivery fees, etc. shall be the responsibility of the contractor.

1.6 ADJUSTMENT OF CONTRACT COMPLETION

A. Request for an extension of the contract completion date by the Contractor(s) shall be supported with a justification, CPM data and supporting evidence.

B. Actual delays in activities/events which, according to the computer-produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01325

SECTION 01330 - SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included This Section:

1. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;
   a) Submittal schedule.
   b) Shop Drawings.
   c) Product Data.
   d) Samples.

B. Administrative Submittals:

1. Refer to Division-1 and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
   a) Permits.
   b) Applications for payment.
   c) Performance and payment bonds.
   d) Insurance certificates.

1.2 SUBMITTAL PROCEDURES

A. Submittal Preparation:

1. Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
2. Include the following information on the label for processing and recording action taken:
   a) Project name and Architect's project number.
   b) Date.
   c) Name and address of Architect.
   d) Name and address of Contractor.
   e) Name, phone number and address of subcontractor.
   f) Name, phone number and address of supplier.
   g) Name, phone number of manufacturer and his representative.
   h) Number and title of appropriate Specification Section.
   i) Drawing number and detail references, as appropriate.
3. As a result of the Contractor's review, the Contractor shall indicate that the result of his review was:
   a) "Reviewed and Approved"
   b) "Reviewed – Approved As Noted"
   Prior to submission to the Architect.
4. If appropriate, and/or permitted by the Contract Documents, the Contractor may stamp the Drawings or Submittal information "Received for Record Purposes Only", if no review of the material, by the Contractor, is required by the Contract Documents.
5. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
6. Provide shop drawings or submittal information individually. Do not group like trades into one submittal binder.

B. Identification Number:

1. Each Submittal shall be numbered to comply with the following ***example***:
   a) The numbering system will use the specification section as the initial submittal number, i.e. for items required in Section 06190 – Wood Trusses – the submittal will be "06190.01". The "01" identifies the submittal as the first, or submittal number one (1) under that specification section. If additional submittals are required under Section 06190, then the second submittal will be identified as "06190.02", in sequence. In the event a submittal is returned (example above – 06190.02) to the Contractor, and is marked either "Reviewed and Disapproved" or "Reviewed – Revise and Resubmit", then, the revised submittal will be identified as 06190.02.A, with the suffix "A" indicating the first resubmittal of this item, and using, progressive letters in the event of multiple re-submittals.

C. Submittal Review by Contractor:

1. The Contractor is required to review each submittal, including, but not limited to, shop drawings, product data, samples, cut sheets and similar submittals.
2. Submittals on items, materials, installations, products or vendors that are not specified or indicated on the drawings will be considered **substitutions**, and as such, must comply with provisions of Section 01631 – Product Substitutions, of this Project Manual.
3. Following the Contractor review of the submittal, the Contractor will place a "review stamp" on each copy of each submittal, and sign, date and indicate action taken in conformance with the "Submittal Preparation" sub-section of this Section. The same information indicated on the Contractor's review stamp will also be indicated on the "Submittal Transmittal" form included with this Section.
4. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that he has determined, or will do so, the suitability of materials, field measurements and field construction and criteria related thereto, and has checked and coordinated the information contained within such submittals, with the requirements of the Work and the Contract Documents.
5. The responsibility for coordinating the Shop Drawings, including technical data, capability (warranted and implied), sizing, color, texture, etc. shall be the sole responsibility of the Contractor. The coordination between subcontractor and/or materials supplier shall be the responsibility of each Contractor/Prime Contractor. The Project Coordinator, as defined in the Specifications, shall be responsible to supervise this activity.
6. Submittals that do not comply with provisions of this sub-section will be returned not reviewed, not logged and will be considered non-responsive.

D. Partial Submittals:

1. Partial or incomplete submittals are not acceptable. Any submittal or shop drawing received by the Architect, that does not contain all portions required by each Section of the Specification, will be returned not reviewed, not logged and will be considered non-responsive.
2. Exceptions will be considered on a case by case basis, such as duct drawings and structural steel drawings on multi-level, multi phased or multi-zone projects. Requests for exceptions must be submitted in writing by the Contractor for evaluation and response, a minimum of 30 days prior to the submittal date indicated on the Contractor's approved/updated Submittal Schedule.

E. Submittal Review by Architect:

1. The Architect will review each of the Contractor's submittals one initial time, and, should re-submittal be required, one additional time to verify that the reason(s) for re-submittal have been addressed by the Contractor and corrections made. Any review required by the Architect, other than the two (2) indicated above, will be considered additional scope

of work for the Architect, and the Contractor shall reimburse the Owner for all costs incurred, including the cost of the Architect's services, made necessary to review such additional re-submittals.

1.3 SUBMITTAL SCHEDULE

A. Shop Drawings:

1. The Contractor shall prepare and submit to the Architect, not later than 30 days following the Date of Commencement, and prior to the Contractor's first Application for Payment, a schedule of all Shop Drawings and Submittals as required by the Contract Documents. No Applications for Payment will be reviewed or approved until receipt and approval of the Submittal Schedule.
2. Schedule shall indicate dates for submission. The Contractor is required to submit a monthly updated submittal schedule with each Application for Payment. Pay applications received without the Submittal Schedule update will not be reviewed and will be returned to the Contractor.
3. All Shop Drawings, Samples and Submittals for approval shall be completed within sixty (60) calendar days following the Date of Commencement.
4. Coordinate the Schedule with the schedule of the individual subcontractors, suppliers or vendors, and the Contractor's Construction Schedule.
5. The Architect will schedule his manpower to review submittals based on the time limits established above. Submittals by the Contractor received beyond the time limit established above may affect the Architects manpower schedule resulting in additional cost; the Contractor shall reimburse the Owner for the costs of the Architect's services for the review or approval beyond the time stipulated above.

1.4 SHOP DRAWINGS

A. General:

1. All submittals shall be dated and shall contain the project name; description or names of equipment; materials or equipment which are to be installed, reference to the Section of Specifications where it is specified and Drawing number where shown.
2. The use of Contract Documents for submittal of shop drawing is prohibited.

B. Shop Drawings:

1. Submit legible, unfolded, double-coated, reproducible transparencies (positive side up sepia) of each drawing. Each drawing shall have a clear space for stamps per requirement of the Submittal Preparation above.
2. When phrase "by others" appears on Shop Drawings, the Contractor shall indicate on drawing whom is to furnish material or operations so marked before submittal.
3. When Shop Drawings are marked after review by the Architect, with any variation of the wording "resubmit", or words of like meaning, the Contractor shall correct the original tracing and submit a new transparency for approval, to the Architect. After the Architect completes a review of each Shop Drawings transparency, the Architect will return only the marked up or reviewed transparency to the Contractor. Additional prints required by the Contractor for further or other use(s), other trades, suppliers, vendors, shall be provided by the Contractor as required.
4. Electronic copies of the Contract Document, for use in preparing Coordination Drawings, may be furnished by the Architect only after:
   a) The Contractor submits a request for same in writing to the Owner.
   b) The Owner forwards, to the Architect, a copy of the Contractor's request, together with a signed "Electronic Data Transfer Letter Agreement" which will indicate the

Owner's approval of the Contractor's request for electronic copies of the Contract Documents.

c) Contractor's written agreement to pay for an Architect's "Change in Services" which will permit additional fee to the Architect for services connected with the furnishing of Electronic Data to the Contractor.

C. Sheet Size:

1. Submit Shop Drawings on sheets 30" x 42".

1.5 MANUFACTURER'S LITERATURE

A. For standard manufactured items not requiring special shop drawings for manufacture, submit sufficient copies of manufacturer's catalog sheets to permit the Architect to retain one copy, provide one copy for the Owner, and to return adequate copies for the Contractors use and distribution. Catalog cuts shall be of item to be furnished, showing scale details, sizes, dimensions, performance characteristics, capacities, wiring diagrams and controls, and all other pertinent information necessary for a review by the Architect.

1.6 MATERIAL SAFETY AND DATA SHEETS (MSDS)

A. Provide MSDS sheets as follows:

1. One set to keep on site at all times
2. One set to be submitted for final close-out documents. See Section 01781 - Project closeout for more information.
3. Do not forward MSDS to the Architect for Review or distribution.

1.7 SAMPLES

A. Unless otherwise specifically directed by the Architect, all Samples shall be of the precise article proposed to be furnished by the Contractor.

B. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.

C. Refer to Specifications for requirements for Samples that illustrate workmanship, fabrication techniques and details of assembly, connections, operation and similar construction characteristics.

D. Submit all Samples in the quantity that is required to be returned plus one which will be retained by the Architect.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01330

SECTION 01356 – CONSTRUCTION SAFETY AND SECURITY

PART 1 - GENERAL

1.11 DESCRIPTION:

A. This is to advise all contractors of policies required by the Owner during construction projects. It is your responsibility to assure that your employees and subcontractors are aware of and follow these requirements. The Owner patients, visitors, and employees must be protected from construction operations at all times. The Owner will make every effort to work with you to assure safety, timely access to construction areas, and other construction requirements. Your cooperation is appreciated.

1.12 CONSTRUCTION MANAGEMENT CONTACT

A. Please contact Onslow Memorial Hospital's Construction and Engineering Office located at 317 Western Boulevard, Jacksonville, NC 28546 for questions. A pre-construction meeting will be held with you by the Construction and Engineering Office to review hospital policies. A contact person will be identified for questions you have during construction.

1.13 EMERGENCIES

A. For medical or police emergencies, please call 911. For fire emergencies, please call 911 and the Construction and Engineering Office. In the event of fire, activate the fire alarm system.

B. In the event of an emergency, please contact the Construction and Engineering Office at 910-577-2393.

C. Please provide the Owner's designated contact person with a list of emergency telephone numbers for your company prior to beginning your construction project.

1.14 INTERIM LIFE SAFETY MEASURES (ILSM)

A. The Owner and its subsidiaries require that Interim Life Safety Measures (ILSM) be implemented and documented so that the level of life safety is not diminished in any occupied area and a safe environment is maintained throughout construction of or alteration to the building or grounds. A pre-construction meeting will be held with contractors for projects involving implementation of ILSM. Requirements of this program and other important policy/procedures will be reviewed.

B. Requirements of the ILSM program are listed below. A "Project Monitoring Log" is attached for your use. Please make or request additional copies of this log as may be required. Contractors shall submit completed logs with your invoices, or once a month, whichever is less. **NOTE:** Invoices or pay requests submitted without the Project Monitoring Log will not be processed for payment.

1. Monitor and document on a daily basis that free and unobstructed access is maintained to the Facility's Emergency Department during construction. This includes roadways, sidewalks, corridors, and other access to the Emergency Department.

2. Monitor and document on a daily basis that free and unobstructed access for Emergency Forces (Fire, Police, Rescue, and other emergency forces) to the Facility and the work area is maintained during construction. This includes roadways, sidewalks, corridors, and other access.

3. Monitor and document on a daily basis that all required means of egress (corridors, stairs, doorways, exits) are free and unobstructed at all times. Required exits will be identified at the pre-construction meeting. Material storage and debris removal must be accomplished to reduce the flammable and combustible fire load of the building to the lowest level necessary for daily operations.

4. Monitor and document on a daily basis that temporary means of egress through construction areas are free and clear and provided with a stable walking surface.

5. Monitor and document on a daily basis that all building compartmenting fire and smoke walls are maintained continuous and uninterrupted. When fire and smoke walls and their protected openings are compromised, provisions for supplementary life safety systems and/or the establishment of a fire watch may be required.

6. Monitor and document on a daily basis that fire and smoke detection, suppression, and alarm systems in existing structures have not been impaired by construction operations. A minimum of 48 hours notice is required for any construction operations that will require modification to fire alarm or suppression systems. The Construction & Engineering Office will work with you to coordinate this. Installation of temporary systems and/or the establishment of a fire watch will be required if the alarm system or suppression system is deactivated for 4 or more hours in any 24 hour period. Notification of the Fire Marshal and hospital staff will also be required.

7. Monitor and document on a daily basis that temporary construction partitions are smoke tight (and/or fire rated if required), and built of noncombustible or limited combustible material that will not contribute to the development or spread of fire

8. Monitor and document on a daily basis that additional firefighting equipment required for your construction area is in place, operational, and that personnel know how to use it.

9. Monitor and document on a daily basis that excess debris and new material storage is minimized in the area of work. Debris must be removed from the site daily.

10. Monitor and document on a daily basis that all required supplemental fire/smoke detection systems are in place and active. Supplemental systems may be required when other life safety elements are in place and active. Supplemental systems may be required when other life safety elements are compromised or made inactive by construction activities. Supplemental systems must be tested for proper operation on a monthly basis. All testing is to be documented.

11. If an event occurs that prevents you from checking "yes" on the Project Monitoring Log, immediately contact the Owner's designated contact person or, if unavailable, the Facilities Department (24 hours), so that alternate measures may be taken.

12. The Project Monitoring Log shall be kept and maintained within a shatter-resistant glass enclosure at the project entrance.

1.5 INFECTION CONTROL

A. Infection Control Monitoring procedures have been developed to prevent dust-borne infections related to air handling and environmental dispersion during construction, renovation, or maintenance projects in the Hospital. The Contractor requirements for Infection Control Monitoring are included in the attached Project Monitoring Log. It is the Contractor's responsibility to complete and maintain this log on a daily basis. Please make or request additional copies of this log as required. This log is to be submitted with the Contractor's pay requests, or once a month, whichever is less. Invoices or pay requests submitted without the Project Monitoring Log will not be processed for payment.

1.6 REQUIRED NOTIFICATION

A. Construction & Engineering Office as designated for your project must be notified a minimum of 48 hours in advance of any construction work involving existing facilities operations. A minimum of 48 hours advance notice is required for construction work that will require implementation of Interim Life Safety Measures (ILSM). For work requiring the temporary shutdown of utilities a minimum of 1 week's notice is required.

1.7 HOT WORK

A. The purpose and use of a hot work permit is to authorize work on a specific date, at a particular time, and at a location within the Facility that the Hot Work is to be performed. Hot Work is not permitted in the Facility without prior authorization by Construction & Engineering. A Hot Work Permit must be obtained prior to performing the work. The Hot Work permitting process does not supersede any required local, state, or federal requirements for performance of Hot Work

1.8 FIRE AND SMOKE RATED PARTITIONS AND ASSEMBLIES

A. Many partitions, roof decks, floors, columns, and entire rooms also carry fire and smoke ratings of varying degrees of resistance. All contractors are responsible for verifying rated assemblies in their area of work. Contractors are also responsible for maintaining ratings of assemblies affected by their work. Assistance in verifying ratings may be obtained from the Owner. If during the course of your work an existing assembly is found not to meet its designated rating due to damage or incomplete construction, you are required to notify the Owner's Facilities Department.

1.9 ABOVE CEILING WORK PERMIT

A. When above ceiling work is required, the contractor shall obtain an above ceiling work (ACW) permit. Above ceiling work is not permitted in the Facility without prior authorization by Construction & Engineering Office. If a contractor is found working in the ceiling without the proper ACW permit, they will be asked to leave. The permit must be kept in the possession of the contractor or posted on the jobsite for the project duration. One permit per trade is required.

B. The contractor shall inspect and identify all pre-existing conditions to the Construction & Engineering Office personnel. Any deficiencies found when closing out the project will be the contractors' responsibility to repair.

C. Upon completion of the work, the contractor and the Construction & Engineering Office representative will perform an inspection and finalize the ACW permit with the Facility Department.

1.10 OTHER INFORMATION

A. All contractors working on the Owner's property are advised that the Facility maintains a hazard communication program. This program provides information regarding hazardous chemicals on site and, if required, protective action to be taken when working with or around these chemicals. This information will be made available on request by contacting your designated Construction & Engineering Office.

B. All contractors, as may be required by law, are responsible for providing a hazardous energy control program (lockout/tagout) to prevent the inadvertent release of energy by machines, equipment, or other sources. The contractor is responsible for coordinating this program with the Owner when exiting utilities/facilities are involved. The Owner's lockout/tagout devices supersede all others.

C. Work at the Owner's facilities may involve confined spaces with associated hazards. The contractor is responsible for maintaining a confined space entry program and assessing any potential confined spaces.

D. Identification Badges: All construction / maintenance contractors will wear identification badges at all times while working at the Owner's facilities. All badges will be provided by the contractor. The contractor will create badges from the Owner badge template (see Attachment #2) using black ink on plain white paper. The identification badges will contain the employer's name and project name on the front while having the Contractor Fire Response (RACE) information on the back of the badge. The identification badge must be legible and be worn in a manner so that the information on the badge is easily visible. In extenuating circumstances, exception to this policy may be granted by the Project Manager.

E. Access Badges: The Owner will provide the general contractor with a minimum number of badges to access the construction area. These badges will be issued at the preconstruction conference by the Owner representative. These badges are to be returned at the end of construction. **A fee of $15.00 will be charged for any lost or unreturned badge.**

F. Contractor shall provide sufficient quantities of portable air scrubbers as required to maintain negative air pressure in the construction area relative to all adjacent spaces. Portable air scrubbers shall be Abatement Technologies Model PAS2400 or equal approved in advance by the owner, capable of exhausting 700 CFM at low speed or 2,100 CM at high speed; equipped with a 99.97% HEPA filter; 120 volt/single phase cord and plug connection. Provide flexible duct from each air scrubber to exhaust air to the outside of the building. Use care and coordinate with the owner to locate exhaust discharge to not interfere with or compromise operation of existing outside air intakes, pedestrian or vehicular traffic, patient room windows, or other sensitive locations.

G. Unless otherwise specified, all Owner construction projects that require differential pressure monitoring shall use the Abatement Technologies Model PPM3 Portable Differential Pressure Monitor with wall hanger bracket (RPM-HANG). The contractor shall provide the monitoring device and a source of power. The following device settings are required:

Interval logging: off
Alarm Delay: 180 seconds
Pressure Units: Pascal
Room Limits: -2.5 Pascal
Job #: Provided by Project Manager

The contractor is required to record pressure readings twice a day on the Project Monitoring Log. The contractor is required to bring a printout of the monitoring logs to each OAC meeting.

H. Shirts, appropriate clothing and shoes are required. Violation of these requirements will result in the offender being restricted from the site.

I. Sexual or racial harassment will result in the offender being restricted from the hospital site.

J. Construction personnel are subject to the Hospital's Parking Policy. Illegally parked vehicles are subject to being ticketed and/or towed at the owner's expense.

K. The Owner prohibits the use of tobacco products on all of its campuses and properties.

1.11 PARKING POLICY

A. Construction parking will be designated at an offsite location. Existing roadways, sidewalks, etc. must remain clear at all times. Please contact your designated Construction & Engineering Office contact person for special conditions requiring closure of roadways, sidewalks, etc.

1.12 ONSLOW MEMORIAL HOSPITAL CONTRACTOR GUIDELINES

A. All construction personnel shall observe and comply with the attached "Contractor Guidelines" while performing work at Onslow Memorial Hospital

ATTACHMENTS:

1. Project Monitoring Log
2. Construction & Engineering Office Badge Template
3. Contractor Guidelines
4. Hot Work Permit
5. Utility Shutdown Permit

END OF SECTION 01356

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

PROJECT MONITORING LOG
(Contractors must submit all completed forms with each pay application)

PROJECT NAME:	PROJ. #	FOR THE WEEK OF:						
CONTRACTOR:		MON	TUES	WED	THUR	FRI	SAT	SUN
	DATE:							
NAME OF OBSERVER:								
Check all that apply		Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
☐ Is access to the Emergency Dept. kept unrestricted and unchanged by construction activities?								
☐ Is access to the Entity by Emergency Forces unrestricted by construction activities?								
☐ Are any means of egress (corridors, stairs, doorways, exits) unblocked and unrestricted by construction activities?								
☐ Are temporary means of egress free and clear, provided with a stable walking surface, and provided with visible signage?								
☐ Are building compartmenting fire and smoke walls uncompromised by construction activities?								
☐ Are existing fire and smoke detection, suppression, and alarm systems in place and operational?								
☐ Are Temporary Partitions in place, non- or limited combustible, and smoke tight?								
☐ Is additional firefighting equipment in place?								
☐ Is excess debris and new material storage minimized to that required for the work?								
☐ Is supplemental temporary fire/smoke detection and/or system in place and active if required? Systems must be tested monthly. Indicate test date:_____								
☐ Erect appropriate barrier containment as directed & ensure that the barriers remain sealed.								
☐ Shut off return air vents in project zone if possible and seal around grills.								
☐ Exhaust air and dust to outside if possible; if not, HEPA filter before air returns to HVAC system.								
☐ Has negative pressure been maintained? Record twice per day (AM \PM)								
☐ Was debris removed from the site in cover carts?								
☐ Designated elevator used?								
☐ As required, use protective outer clothing & remove prior to leaving site.								
☐ Anteroom provided as required.								
☐ Use and maintain tacky mats.								
☐ Wet-mop cleaning of project zone.								
☐ Damp-wipe tools if removed from project zone or place in clean, covered, container.								
☐ Make provisions for dry storage of materials.								
☐ Do not install wet building materials & replace if water damaged.								

Owner's Representative Weekly Check: _____

If an event occurs that prevents you from checking yes on this form, immediately contact the designated Owner representative or the Facilities Dept. (4/22/13)

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

CONSTRUCTION & ENGINEERING BADGE TEMPLATE
(Contractor to provide for all construction/maintenance contractors)

CONSTRUCTION & ENGINEERING

Contractor: _____

Project: _____

Contractor Fire Response

R emove all persons from danger
A ctivate the alarm, dial 911
C ontain the fire
E xtinguish/evacuate

(This to be located on back of each identification badge)

CONSTRUCTION & ENGINEERING

Contractor: _____

Project: _____

Contractor Fire Response

R emove all persons from danger
A ctivate the alarm, dial 911
C ontain the fire
E xtinguish/evacuate

(This to be located on back of each identification badge)

CONSTRUCTION & ENGINEERING

Contractor: _____

Project: _____

Contractor Fire Response

R emove all persons from danger
A ctivate the alarm, dial 911
C ontain the fire
E xtinguish/evacuate

(This to be located on back of each identification badge)

CONSTRUCTION & ENGINEERING

Contractor: _____

Project: _____

Contractor Fire Response

R emove all persons from danger
A ctivate the alarm, dial 911
C ontain the fire
E xtinguish/evacuate

(This to be located on back of each identification badge)

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

FACILITIES + PROPERTIES BADGE TEMPLATE
(Contractor to provide for all construction/maintenance contractors)

CONSTRUCTION & ENGINEERING

Contractor: _____

Project: _____

Contratista de Respuesta a Incenndios
R: Remueva todas las personas en peligro
A: Active la alarma; despues llame al 911
C: Contener el fuego
E: Extinguir el fuego

(This to be located on back of each identification badge)

CONSTRUCTION & ENGINEERING

Contractor: _____

Project: _____

Contratista de Respuesta a Incenndios
R: Remueva todas las personas en peligro
A: Active la alarma; despues llame al 911
C: Contener el fuego
E: Extinguir el fuego

(This to be located on back of each identification badge)

CONSTRUCTION & ENGINEERING

Contractor: _____

Project: _____

Contratista de Respuesta a Incenndios
R: Remueva todas las personas en peligro
A: Active la alarma; despues llame al 911
C: Contener el fuego
E: Extinguir el fuego

(This to be located on back of each identification badge)

CONSTRUCTION & ENGINEERING

Contractor: _____

Project: _____

Contratista de Respuesta a Incenndios
R: Remueva todas las personas en peligro
A: Active la alarma; despues llame al 911
C: Contener el fuego
E: Extinguir el fuego

(This to be located on back of each identification badge)

Contractor Guidelines

Onslow Memorial Hospital
February 05, 2016

When outside contractors are performing work for the Hospital or the Hospital Authority, there are several items that should be communicated to all subcontracted employees to protect themselves and the hospital patients, visitors, and employees. They are as follows:

Contractor Badges
All contractor work on any hospital property will require an approved contractor badge identifying the (their) employees. If the contractor does not provide badges, temporary contractor badges will be provided by the hospital. Contractor Badges may be checked out from the Maintenance Department.

Interim Life Safety
JCAHO and OSHA require the hospital to take special precautions when having work performed within the hospital or any of its subsidiaries. Anytime work is performed, the hospital will evaluate to determine if any of the patient, visitor, employee, and/or contractor Life Safety provisions are being compromised. This covers many situations including those in which exits or corridors are blocked and in which access to the Emergency Room is blocked. We provide a special evaluation form provided and filled out by the Director Facility Engineering & Safety. This form will be reviewed with the contractor and special provisions made as necessary to insure the work performed is done in a safe manner.

General Hospital Alarms
There are several alarms, which may be announced from time to time over the hospital paging system. All code alarms will be announced three times. The announcement will be repeated again in 30 seconds and one-minute intervals. Below is a list of alarms, what each means, and what the contractor should do if any of these are announced.

Codes requiring contractors vacate the facility:
The codes listed below are those for which contractors shall stop work and immediately leave the building to regroup at a predetermined location in the parking lot. It is recommended that all contractors meet at their designated parking lot or construction trailer. The general superintendent should count to determine that all personnel are accounted for and report to the hospital construction manager.

- **Code Red = Any fire**
  If a fire develops in a construction area, the contractor should perform the following:
  Activate the nearest Manual Fire Alarm Pull Station
  Call the switchboard operator at 910-577-2444 and report the location of the fire
  Assist hospital personnel in removing patients or visitors in harms way
  Use available fire extinguishers to extinguish the fire and/or stop its spread
- **Security Alert - Location**
- **Security Alert Bomb Threat**

Re-entry into the facility should not occur until the Director of Facilities Engineering & Safety informs the general superintendent/technician that it is safe to do so.

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

Codes permitting contractors to remain in the work area:
In the event of one of the following codes, contract employees are asked to simply stop and note any unusual activity or persons in their work area and report such to the switchboard at extension 2444. Such observations may include vehicle tag number or description of person departing with a child. If a person or vehicle is observed do not attempt to stop them.
They may be dangerous. The sheriff department, police department, or FBI personnel will handle the situation.
Code Pink = Infant/Child Abduction
Security Alert Hostage Situation

Contractors are asked to remain in their work area and make the way clear for any emergency personnel needing to pass through the work zone.
Facility Alert Technological Interruption
Security Alert Controlled Access ER

Code All Clear
At the end of any of the above codes, the operator will announce an "All Clear" signal. When announced, this means the emergency has passed and it is ok to return to work as usual.

General Dress and Conduct Codes
All contract employees are expected to dress appropriately for the work being performed. If the construction area is designated as a "Hard Hat" area, all employees, contractors, and visitors will abide by the same rules. Protective clothing, hearing protection, safety glasses, etc. will be required when appropriate. It is the responsibility of the contractor to provide the appropriate gear and tools for his/her personnel. The contractor will off load tools and materials and park in assigned areas as designated.

Shorts and muscle type tee shirts are not allowed. Shirts or pants with rips, tears, of holes are not allowed. Shirts with inappropriate or suggestive writing are not allowed.

Contract employees are required to be polite to all hospital employees, patients, and visitors. Fraternizing with hospital employees is considered inappropriate. Foul language or suggestive behavior of any type is grounds for permanent removal from the work site.

Contract employees are not to make use of the cafeteria facilities.

Smoking
Onslow Memorial is a Tobacco Free facility, this includes E-cigarettes. No tobacco products are allowed anywhere on the OMH Campus & parking lots. No exceptions will be allowed.

Ladder Permits
If the contractor requires the use of a ladder in the accomplishment of his/her work, a ladder permit must be secured from the maintenance department. This is the hospital's method of communicating to security, safety and infection control that work above the ceiling is being coordinated through and inspected by the maintenance department. OMH Maintenance and Infection Control may inspect the areas under service. Any penetrations must be sealed with a fire stopping product, approved by the Maintenance Director.

Use of Cellular Telephones, Two-Way Radios and Pagers
Contractors shall be allowed to use cellular telephones, two-way radios and pagers, if required as a part of their contract work, in non-patient care areas. Use of this equipment in patient care areas is restricted. Any exception to this policy must be cleared through the Facility Engineer & Safety Officer prior to start of job.

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

Shut Down Request
Required: Permit for Utility Shutdown
The Contractor shall notify maintenance 72 hours prior to the time of any necessary shut down. At no time should a contractor shut off a utility. ONLY AUTHORIZED HOSPITAL STAFF hold the responsibility for a utility shut off. Any questions with regard to this policy should be directed to the Maintenance Director 577-2393 or (2516) or the Director of Facilities Engineering & Safety 577-2371 or (2410).

Cutting and Welding
Required: Permit for welding, cutting, hot work
The Contractor shall notify maintenance 72 hours prior to performing cutting, welding, or the use of any open flame and obtain a Hot Work Permit. No contractor will perform cutting, welding, or the use of any open flame while on hospital property without the required permit. Call extension 2393/2516 for further information and instructions. Construction staff will provide a “fire watch” with a fire extinguisher present.

Confined Space Entry
No contractor will enter a confined space unless a Confined Space Entry permit has been obtained - for further information and instructions contact the Maintenance Director (577-2393) or office secretary (577-2516). A copy of the Confined Space Entry permit must be sent to the maintenance director 72 hours prior to any confined space entry.

Lockout/Tagout
The hospital strictly follows the OSHA lockout/tagout procedures. If any utilities or potentially dangerous service is to be disconnected for any reason, permission from the Construction Manager or the Director of Facilities is required and the OSHA Lockout/Tagout procedures will be followed. Call extension 2393/2516 for further information and instructions.

Asbestos
The hospital has detailed records of the location of any asbestos within the facility. Prior to the start of any job, the contractor will be alerted as to the possible location and danger of any asbestos materials. If a contractor discovers or suspects any asbestos materials, he/she should stop work and notify the Director Facility Engineering & Safety or the Director of Maintenance immediately. The hospital will be solely responsible for abatement of asbestos conditions within the facility.

MSDS [SDS]
All contractors are responsible for maintaining SDS sheets for all chemicals used or stored on the job site. If anything other than standard construction products are provided or used, permission must be obtained and SDS sheets filed with the Director of Facility Engineering & Safety. Call extension 2410 or 2371 for further information and instructions.

Hazardous Chemicals
The maintenance department will make all contractors aware of hazardous chemicals in the vicinity of the area in which they are working.

Emergency Phone Numbers
All contractors working in the facility will provide emergency telephone numbers so they can be reached 24 hours per day. These will be used to contact contract personnel in emergency situations only. In addition, the hospital will provide the contractor with a list of contacts and emergency telephone numbers of hospital personnel who will be involved in each project. Anytime anyone is inside the hospital, the general emergency telephone number from any location for any reason is 2444. This is posted on all of the in house telephones and goes directly to the switchboard operator. This receives priority treatment over dialing “0”.

ONSLOW MEMORIAL HOSPITAL
SECOND FLOOR REFURBISHMENT

Special Access Areas
Some areas of the facility require special access and/or special protective equipment. These areas include the OR, CSS, Laboratory, Morgue, Pharmacy, and various other patient care areas. If a contractor is working in any of these areas, special arrangements will be made via the Director of Maintenance. No contracted personnel should ever enter a patient room or private space without being accompanied by the appropriate hospital personnel.

PRIOR TO BEGINNING ANY WORK:
All Contract Firms are required to submit a current Certificate of Liability, to include Workmans Compensation, which Maintenance shall submit to the Director of Facility Engineering & Safety, prior to onset of project. Should the terms of the liability expire during the course of the project the contracted firm is responsible for resubmitting a current certificate of liability.

PAYMENT: All invoices are processed on 30 day terms and must be accompanied by a copy of the Certificate of Liability to insure expiration has not lapsed.
Invoices should be mailed to: OMH Engineering 215 Station St. Jacksonville, NC 28546.

All Contract Firms are **REQUIRED** to submit a **W9 Form** (to include Federal ID# / or Social Security#) **PRIOR TO BEGINNING ANY WORK.** The Maintenance Department shall submit the W9 Form to OMH Accounting Department to establish an account with the firm for NC State and Federal Tax purposes.

Should a contractor or sub-contractor have any questions concerning the above information, please contact Sherman Cronan, Director of Maintenance or Michael Holdren, Director of Facility Engineering & Safety. Either can be reached through the switchboard operator at 577-2345.

I have read and understood these instructions: Date _____

Contractor _____

Company _____

Revised: Feb. 02, 2016

Contact List:

Director of Maintenance: 910-577-2393
Maintenance Secretary: 910-577-2516

Director of Facilities & Engineering: 910-577-2371
Engineering Secretary: 910-577-2410

Security: 910-577-4842
This phone rolls over to OMH Switchboard. Relay to the switchboard operator who you are, where you are & the matter at hand and a security guard will be directed to your area.

_____

_____

Hot Work Permit

Electromark

CUTTING, WELDING AND HOT WORK PERMIT TAG

APPLIES ONLY TO AREA SPECIFIED BELOW

Date _____ Building _____

Floor _____ Dept. _____

Time Started _____ Completed _____

Work to be Done _____

_____

_____

This Permit Expires _____

Nearest Fire Alarm Box _____

Fire Dept. No. _____

PRECAUTIONS

Do not cut, weld, or use open-flame or spark-producing equipment without taking the following precautions:

- ☐ Sprinkler protection in service
- ☐ All flammables/combustibles removed 40 ft. from work area or protected with flameproof covers (not ordinary tarpaulins)
- ☐ Spark or flame producing equipment inspected and found in good condition
- ☐ Gas cylinders secured and protected from damage
- ☐ Ample portable extinguishers provided at work site
- ☐ Do not use in tank or containers of flammable or combustible materials until they have been purged of all residues (liquids, vapors, lint, dust, etc.)
- ☐ All hazardous operations discontinued
- ☐ Floor and wall openings within 40 ft. covered
- ☐ Fire watch provided in the area and the floors above and below for at least a half hour after all work has been completed

Area checked after job completion by _____

Welder's Signature _____ Date _____

Supervisor Signature _____ Date _____

Utility Shutdown Permit

Permit for Utility Shutdown

Risk Engineering

**BEFORE STARTING WORK, REVIEW ALL SAFETY PRECAUTIONS.
CAN THIS JOB BE AVOIDED OR IS THERE A SAFER WAY?**

THIS PERMIT IS REQUIRED FOR ANY TEMPORARY SHUTDOWN INVOLVING ELECTRICAL, DOMESTIC WATER, CHILL WATER, STEAM, SEWER, MEDICAL GAS, FUEL, FIRE ALARM, BUILDING ALARM, COMMUNICATIONS, SPRINKLER, IRRIGATION AND MISCELLANEOUS SYSTEMS ON OMH PROPERTY.

Instructions

Supervisor:

1. Complete CHECKLIST at right.
2. Complete the form and retain Part 1.
3. Issue Part 2. to competent person doing the job.
4. Verify LOCKOUT - TAGOUT

Permit Information

Work Done By:

☐ Employee

☐ Contractor

Permit number

Locations/Building/Floor

Work to be done

Person doing job (print and sign name)

Supervisor signature - Contractor Representative

I have verified that the above location has been inspected and the required PRECAUTIONS AND SAFEGUARDS have been taken. Permission is authorized only for the above work.

Date permit expires | Time

Date work completed | Time

Signature - OMH Representative

Utility Shutdown Checklist

Notice Given (Check One)

☐ 72 HOURS

☐ 48 HOURS

☐ 24 HOURS

☐ EMERGENCY

TIME OF SHUTDOWN

TIME OF EXPECTED COMPLETION

DATE OF PLANNED SHUTDOWN

Systems Effected

☐ ELECTRICAL

☐ DOMESTIC WATER

☐ CHILL WATER

☐ STEAM

☐ SEWER

☐ MEDICAL GAS

☐ FUEL

☐ FIRE ALARM

☐ BUILDING ALARM

☐ COMMUNICATION

☐ SPRINKLER

☐ IRRIGATION

☐ MISCELLANEOUS

Special Instructions

Final check-up date | Time

Inspector signature

SECTION 01421 - REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 DEFINITIONS

A. General:

1. Definitions contained in this Section are in addition to those included in the Conditions of the Contract.

B. Indicated:

1. The term "indicated" refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents.
2. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

C. Directed:

1. Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Architect," "requested by the Architect", and similar phrases.

D. Approve:

1. The term "approve" and "approved," where used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.

E. Satisfactory:

1. The words "satisfactory", submitted", "reported", and similar words and phrases shall be presumed to be followed by "to the Architect."

F. Equal To:

1. "Equal To", "Or Architect Approved Equal", and "Or Approved Equal" shall mean products by manufacturers other than those described or listed in the Contract Documents which the Contractor has submitted for substitution prior to bid and have been approved for use by the Architect in Addenda issued prior to execution of the Contract.

G. Regulations:

1. The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

H. Furnish:

1. The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

I. Install:

1. The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, fabrication, placing, anchoring, connecting, applying, working to dimension, finishing, curing, protecting, adjust and test except where otherwise specified, cleaning, and similar operations."

J. Provide:

1. The term "provide" means "to furnish and install, complete and ready for the intended use or operation."

K. Installer:

1. An "Installer" is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
2. The term "experienced," when used with the term "Installer," means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the requirements indicated, and having complied with requirements of the authority having jurisdiction.

L. Trades:

1. Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.

M. Assignment Specialist:

1. Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and assignments are requirements over which the Contractor has no choice or option.
2. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.
3. This requirement shall not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

N. Project Site:

1. Project site is the location of the project.

O. Contract Limits:

1. Contract Limits is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other work as part of the Project.
2. The extent of the Contract Limit is shown on the Drawings and may not be identical with the description of the Project Site.

P. Testing Agencies:

1. A "testing agency" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.2 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Content:

1. This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
   a) Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated.
   b) Words and meanings shall be interpreted as appropriate.
   c) Words implied, but not stated, shall be interpolated as the sense requires.
   d) Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
   e) Streamlined Language:
      1) The Specifications generally use the imperative mode and streamlined language. Requirements expressed in the imperative mode are to be performed by the Contractor.
      2) At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
2. The words “shall be” are implied where a colon (:) is used within a sentence or phrase.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards:

1. Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced.
2. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates:

1. Comply with the standard in effect as of the date of the Contract Documents.

C. Conflicting Requirements:

1. Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels, the Contractor shall refer requirements that are different, but apparently equal, and uncertainties to the Architect for a decision before proceeding.
   a) Minimum Quantity or Quality Levels:
      1) The quantity or quality level shown or specified shall be the minimum acceptable.
      2) The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum.
      3) To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements.
      4) Refer uncertainties to the Architect for a decision before proceeding.

D. Copies of Standards:

1. Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity.
2. Copies of applicable standards are not bound in the Contract Documents.
3. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.
4. At a minimum furnish published standards (ASTM, AASHTO, ACI, ANSI, ASHRAE, SMACNA, UL, etc.) referred to or which are pertinent to these specifications.

E. Manufacturer's installation Instructions:

1. Maintain at the job site a copy of all manufacturers' installation instructions for all products provided or installed as part of this Contract.

1.4 ABBREVIATIONS:

A. General:

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

1.5 ARCHITECTURAL ABBREVIATIONS

A	compressed air lines
A/C	air conditioning
AB	anchor bolt
ABV	above
AC	acoustical
ACC	access, accessories
ACS DR	access door
ACS PNL	access panel
ACT	acoustical ceiling tile
AD	area drain
ADJ	adjustable
AFF	above finish floor
AFG	above finish grade
AHR	anchor
AHU	air handling unit
ALT	alternate
ALUM, AL	aluminum
APPROX	approximate
ARCH	architect(ural)
BB	bulletin board
BD	board
BFP	backflow preventer
BFV	butterfly valve
BITUM	bituminous
BLDG	building
BLK	block
BLKG	blocking
BM	bench mark
BOR	border
BOT	bottom
BR	bumper rail
BRG	bearing
BRK	brick
BTU	british thermal unit
BU	built up
BV	ball valve
C	channel
C&G	curb and gutter
C/HR	crash/hand rail
CAB	cabinet
CB	catch basin
CCT	cubicle curtain track
CD	condensate drain
CEM	cement
CF	chemical feed
CFLG	counterflash(ing),
CFM	cubic feet per minute
CG	corner guard
CHR	chair rail
CHWR	chilled water return
CHWS	chilled water supply
CI	cast iron
CJ	control joint
CL	center line

CLG	ceiling
CLO	closet
CLR	clear(ance)
CM	crown molding
CMU	concrete masonry unit
CNTR	counter
CO	cleanout
COL	column
CONC	concrete
CONSTR	construction
CONT	continuous or continue
CONTR	contract(or)
COORD	coordinate
CP	condensate pump discharge
CPT	carpet(ed)
CR	crash rail
CRS	course(s)
CSK	countersink/sunk
CT	ceramic tile
CU FT	cubic foot (or feet)
CU	copper
CVR	cover
CW	cold water piping
CWR	condenser supply return
CWS	condenser supply water
CY	control valve
D	drain
DBL	double
DET	detail
DIA	diameter
DIM	dimension
DISP	dispenser
DIST	distribution
DM PF	damproofing
DN	down
DR OPNG	door opening
DR	door
DS	downspout
DSPL	disposal (disposed)
DTA	drip trap assembly
DW	dumbwaiter
DWG	drawing(s)
DWR	drawer
DX	direct expansion
E	east
EA	each
EC	electrical contractor
EG	edge guard
EIFS	exterior insulating finish system
EHO	electric hold open
EJ	expansion joint
EL	elevation
ELEC	electric(al)
EMER	emergency
EP	epoxy paint
EQ	equal
EQUIP	equipment
EWC	electric water cooler
EWS	eye wash station
EX/EXIST	existing
EXH FN	exhaust fan
EXH	exhaust
EXP BT	expansion bolt/s
EXP	exposed, expansion
EXT	exterior
EXTR	extruded
F&T	float & thermostat
FACP	fire alarm cabinet panel
FCO	flow cleanout
FD	floor drain
FDTH	foundation
FE	fire extinguisher
FEC	fire extinguisher cabinet
FF EL	finish floor elevation
FHC	fire hose cabinet
FHVC	fire hose valve cabinet
FIN FL	finished floor
FIN	finish(ed)
FIX	fixture
FLASH	flashing
FLEX	flexible
FLR SK	floor sink
FLR	floor(ing)
FLSW	flow switch
FLUOR	fluorescent
FMT	floor mounted toilet
FOC	face of concrete
FOF	face of finish
FOM	face of masonry
FOS	face of studs
FOW	face of wall
FP	fireproof(ing)
FR	fire rated
FRP	fiberglass reinforced plastic
FT	foot
FTG	footing
FVB	film view box
FWC	fabric wall covering
G	natural gas line
GA	gage, gauge
GALV	galvanized
GB	grab bar
GC	general contract(or)
GFRC/GRC	glass fiber reinforced cement
GRG	glass fiber reinforced gypsum
GL	glass, glazing
GLZ CMU	glazed masonry unit

GND	ground
GSKT	gasket(ed)
GSU	glazed structural unit
GTV	gate valve
GW	grease waste
GYP BD	gypsum board
HB	hose bibb
HC	handicap
HD	heavy duty, hub drain
HDW	hardware
HDWB	hardboard
HDWS	hardwood
HGT	height
HK	hook(s)
HM	hollow metal
HO	hold opening
HORIZ	horizontal
HP	horsepower, high-pressure, heatpump
HPR	high pressure steam return
125psi	
HPS	high pressure steam supply
125psi	
HR	handrail/hourly rating
HSR	hose reel
HVAC	heating/ventilating/air conditioning
HW	hot water
HWF	hardwood flooring
HWR	hot water return
HWS	hot water supply
ID	inside diameter
IN	inch
INCL	include(d), (ing)
INSUL	insulation
INT	interior
INV	invert
IP	iron pipe
IVT	i.v. track
JST	joist
JT	joint
KEYBD	keyboard
L	angle
LAD	ladder
LAM GL	laminated glass
LAM	laminate(d)
LAV	lavatory
LB (#)	pound
LBL	label
LF	linear foot
LKR	locker
LL	live load/lead lined
LPG	liquid petroleum gas
LPR	low pressure steam return 15psi
LPS	low pressure steam supply
15psi	
LT WT	lightweight
LTG	lighting
LTL	lintel
LVL	laminated veneer lumber
LVR	louver
MAS	masonry
MATL	material
MAX	maximum
MB	marker board
MBR	member
MC	mechanical contractor
MC	medicine cabinet
MCB	marker/chalk board
MCFD	mineral core fire door
MECH	mechanical
MEZZ	mezzanine
MFR	manufacture(r)
MH	manhole
MHO	manual hold open
MIN	minimum
MISC	miscellaneous
MO	masonry opening
MPR	medium pressure steam return (60psi)
MPS	medium pressure steam supply (60psi)
MRBL	marble
MTB	marker/tack board
MTD	mounted
MTG HT	mounting height
MTG	mounting
MTL	metal
MULL	mullion
N/A	not applicable
n2	nitrogen line
n2o	nitrous oxide line
NC	non-combustible
NIC	not in contract
NO (#)	number
NOM	nominal
NTS	not to scale
O	oxygen
OA	overall
OC	on center(s)
OCBW	on center both ways
OCH	on center horizontally
OCV	on center vertically
OD	outside diameter, overflow drain
OH	overhead
OHS	open hearth steel

OPNG	opening
OPP	opposite
ORD	overflow roof drain
PC	particle core
PC	plumbing contractor
PCF	pounds per cubic foot
PE	paint eggshell
PED	pedimat
PF	paint flat
PL	plate
PLAM	plastic laminate
PLAS	plaster
PLBG	plumbing
PLYWD	plywood
PNL	panel
PNT	paint(ed)
POR	porcelain
PR CST	precast
PR KG	parking
PR	pair
PRV	pressure reducing valve
PS	paint semi-gloss
PSF	pounds per square foot
PSI	pounds per square inch
PT	pressure treated
PTD	paper towel dispenser
PTHR	pass-thru
PTN	partition
PTS	pneumatic tube station
PV	plug valve
PVC	polyvinyl chloride
PVCB	PVC base
PVMT	pavement
PVR	paver
PW	pass window
PWR	power
QT	quarry tile
RAD	radius
RB	rubber base
RBR	rubber or radius
RCP	reinforced concrete pipe
RD	roof drain
RECP	receptor (ACLE)
REF	reference, refrigerator
REINF	reinforce(d), (ing), (ment)
REQD	required
RES	resilient
RET	retaining
REV	revision(s), revised
RF	roof
RFG	roofing
RH	roof hatch
RL	roof leader
RM	room
RO	rough opening
RST	rubber stair tread
RT	rubber tile
RTF	resilient textile flooring
RTU	roof top unit
RWL	rain water leader
S	south, switch
S&R	shelf and rod
SAD	security access door
SAP	secure access panel
SB	splash block
SC	solid core (doors)
SCR	shower curtain rod
SD	storm drain
SEC	security
SECT	section
SFPS	stretched fabric panel system
SHM	security hollow metal
SHR	shower
SHT	sheet
SHT'G	sheathing
SHV	shelf, shelving
SIM	similar
SL	slope
SLC	solid stave core
SOG	slab on grade
SP	soundproof
SPEC	specification(s) (specified)
SQ	square
SR	seamless resilient
SS	sanitary sewer
SSM	solid surface material
SST	stainless steel
ST	stone
STC	sound transmission coefficient
STD	standard
STER	sterilizer
STL	steel
STN	stained
STRUCT	structural
SUS	suspended
SV	sheet vinyl/ safety relief valve
SWGR	switchgear
T&G	tongue & grove
TB	towel bar
TEL	telephone
TEMP	temporary
TER	terrazzo
TF	texture floor
THK	thick(ness)
THRES	threshold
THRU	through
TKBD	tackboard
TLT	toilet
TOC	top of curb

TOM	top of masonry
TOS	top of steel
TOW	top of wall
TPD	toilet paper dispenser
TPTN	toilet partition
TRS	tool resistive steel
TRTD	treated
TS	tube steel
TV	television
TYP	typical
UC	undercut/undercounter
UL	underwriter's laboratories
UNO	unless noted otherwise
UR	urinal
V	vent
VAC	vacuum
VC	variegated coating
VCT	vinyl composition tile
VERT	vertical
VIF	verify in field
VIN	vinyl
VR	vapor retarder
VT	vinyl tile
WWF	welded wire fabric
VTR	vent trough roof
VWC	vinyl wall covering
VWF	vinyl wall fabric
W	wide
W/	with
W/O	without
WALG	wall guard
WC	watercloset
WCJ	wall control joint
WCO	wall cleanout
WD	wood
WDM	waterproofing membrane
WG	wired glass
WH	water hydrant
WI	wrought iron
WIN	window
WO	window opening
WOM	walk off mat
WP	waterproofing
WR	water resistant
WS	wall sconce
WSCT	wainscot
WSSV	welded sheet vinyl

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01421

SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Work Specified In This Section:

1. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

1.2 QUALITY ASSURANCE

A. Regulations:

1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.

B. Electrical Service:

1. Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

1.3 PROJECT CONDITIONS

A. Conditions of Use:

1. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber and Plywood:

1. Comply with requirements in Division-6.

2.2 TEMPORARY FACILITIES

A. Sanitary Facilities:

1. Provide and maintain in a neat and sanitary condition chemical type toilet facilities which comply with the requirements and regulations of the Department of Health or of other bodies having jurisdiction. These facilities shall be available to all workers on the job.

B. Drainage:

1. Keep excavations, pits, trenches, footings, and floors free from water to protect all work and to afford satisfactory working conditions. Provide any temporary ditches, sumps, pumps, or drains necessary for this purpose.

C. Offices:

1. Provide an office facility as required at the site which shall be large enough for the Contractor's use, for use as a coordination office, and for the Architect's use.

D. Water Service:

1. Provide, protect, and maintain a system of temporary water service, including all associated cost, until removal is authorized by the Architect. Location will be determined by the owner.

E. Light and Power Service:

1. Make all arrangements and pay all charges to provide, protect, and maintain a system of temporary light and power in a safe operating condition and in compliance with applicable State requirements.
2. Provide adequately sized distribution panel(s) with sub-feeds as required for Trades and temporary power for tools etc.
3. Provide sufficient 20 amp branch circuits with NEMA grounded type receptacles so spaced that from any part of the building(s) an outlet can be reached by a 50 foot extension cord for 110 volt appliances and 100 foot extension cord for 220 volt appliances.
4. Provide proper temporary lighting sufficient to permit proper workmanship to be conducted by all crafts and suitable for maximum safety precautions. Provide lamps rated from 100 watts to 300 watts as necessary and generally located as follows:
   a) One for every 400 square feet or interior rooms with minimum of one light per room except closets and pipe spaces.
   b) One for every 800 square feet of rooms with exterior windows or skylights.
   c) On 20 foot centers in corridors with minimum of 1 per corridor.
   d) Temporary electricity shall be available at all hours (as required) to all Contractors during the entire construction period.
5. Provide temporary service other than that specified above as may be required for the completion of the project.
6. Provide additional service if required for temporary air conditioning.

F. Stairs, Ramps, Chutes and Hoists:

1. The General Contractor shall provide and maintain temporary stairs, ramps, trash chutes and runways as required.
2. The General Contractor shall provide a materials hoist which shall be suitable for the use of all trades.
3. All apparatus, equipment, and construction shall be in accordance with all applicable State and local laws.
4. Hoisting of materials and equipment shall be provided by the Contractor requiring same.

G. Barricades, Warning Signs and Lights:

1. Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

H. Construction Fence:

1. Provide a suitable construction fence around work area within contract limits, located so as to permit sufficient area for storage of materials and conduct of work by all trades.

2. Materials and methods of fence construction shall be adequate to provide for the safety and security of the project site and shall be the Contractor's responsibility to select; however as a minimum standard, fence shall be chain link type, minimum six feet high, consisting of 9 gauge galvanized wire fabric supported on galvanized posts set firmly in the ground at 10 feet o.c. maximum.
3. Provide screening material on fencing and gates.
4. Provide gates as required.
5. No barbed wire will be permitted.
6. Remove and relocate fence when it interferes with the work of any trade.
7. Keep gates closed at all times and locked during non-working hours.

I. Temporary Parking:

1. Use of Owner's parking lots will not be permitted. There shall be no parking of construction personnel vehicles or the Contractor's company vehicles in the Owner's parking lots. At the Owner's option, any vehicles in violation of this requirement will be towed at the Contractor's expense.

J. Temporary Storage:

1. Only the area as directed by the Owner may be used for storing materials including stockpiling topsoil.
2. At the Owner's option, any stored materials including stockpiled soil in violation of this requirement will be removed at the Contractor's expense.

K. Removal of Temporary Work:

1. Remove from the premises, on or before completion of work, all temporary facilities.

L. Payment of Utility Bills:

1. The Contractor is responsible for any temporary utilities that are needed to complete the Work.

2.3 ENCLOSURE:

A. Bring the entire project to Satisfactory Enclosure as soon as possible, concentrating on any area which can be brought to Satisfactory Enclosure without inhibiting progress on any other area.

B. Satisfactory Enclosure is defined as the condition when exterior wall enclosures and roofing are completed, exterior window and door openings are installed and closed with either temporary or permanent doors in position and glass or an acceptable temporary substitute in sash. Conditions of heat loss shall approximate those of final building conditions.

C. Prior to Satisfactory Enclosure, provide cold weather protection and temporary heat sufficient to permit the work of all trades to proceed without delay caused by adverse weather conditions. Enclosures and heating methods shall be adequate to permit work of all trades to proceed unhampered, and shall be safe. Methods of providing protection are the Contractor's responsibility; however, tarpaulins, heavy sheet plastic, or other comparable means are recommended as minimum acceptable standards.

D. Following Satisfactory Enclosure, secure temporary enclosures and lock exterior doors at the end of each day's work.

2.4 HEAT, VENTILATION AND AIR CONDITIONING:

A. As each area of the building is brought to Satisfactory Enclosure, provide temporary heat and ventilation to protect each area and its contents, to prevent freezing within the area, to dry out the area, and to provide suitable working conditions for the installation and curing of materials at temperatures in the range of not less than 55 degrees F. nor more than 75 degrees F. and in conformance with requirements of the various sections of the technical specifications. From at least ten days preceding the start of the installation of millwork, doors, ceiling tile, wall fabric, and other finish items sensitive to temperature and humidity (whichever is started first) interior temperatures and relative humidity shall be maintained to approximate conditions of the finished project.

B. The temporary heating system shall be of adequate capacity to properly heat the area, and shall be vented as required so as not to produce fumes or vapors damaging to the building, its contents, or personnel. Temporary ventilation equipment shall be adequate to produce the necessary air movement to dry out and ventilate the area during those times when temporary heating or air conditioning is not required.

C. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

D. Provide air conditioning as necessary to maintain 70 deg. F. and humidity conditions approximating those specified for the completed project during the final stages of the work in each area commencing with the time period beginning 10 days preceding the start of installation of millwork, doors, ceiling tile, wall fabric, and other finish items sensitive to temperature and humidity (whichever is started first). The permanent air conditioning system may be used to satisfy this requirement.

E. Provide the necessary materials, equipment, labor, and operating personnel required to operate the temporary heating, ventilating, and air conditioning system (or permanent system when such is complete and ready for use) throughout the required interval of construction when temporary heating, ventilation, or air conditioning is required.

F. When the permanent system is used for temporary heating, ventilating, and air conditioning provide proper operation and maintenance of the heating, ventilating, and air conditioning plant until Substantial Completion. Such items shall consist of but not be limited to maintenance of temporary filters in all equipment to prevent accumulation of dust and dirt in coils, housings, etc.; temporary protection of ductwork from dust, dirt, etc., through the use of cloth covers over duct openings or similar means; and prior to final inspection, replacement of temporary filters with new filters as specified. Provide a thorough cleaning of coils and other equipment of dust and dirt, putting the entire system into first class condition, including cleaning traps and devices and adjustment and renewal of any and all materials and/or equipment not functioning correctly.

G. The permanent air conditioning system may be used to satisfy this requirement; however, the following provisions must be adhered to:

1. Permanent air conditioning system shall not be used until all dust producing activities are completed. Until that time, the contractor shall protect the air conditioning system including the AHU and all ductwork from construction dust and debris by, at a minimum, capping and sealing ductwork as it is installed and covering air distribution devices with plastic to prevent dust and debris from entering the system.

2. Once major dust producing construction activities have been completed, the contractor shall submit a written request to the Architect requesting that the permanent air conditioning system be turned on. The Architect will then review the building conditions

to determine if the project area is clean enough to allow the system to operate. If so, the system will be allowed to start. If not, the contractor will make other provisions to maintain temperature and humidity control within the project. The Architect shall be the final judge as to the cleanliness of the project area and his decision regarding operation of the system is not open to debate.

3. Once the permanent air conditioning system is allowed to operate, the contractor shall maintain temporary filters over all return air inlets located in the project area and shall also provide prefilters and HEPA filters in the AHU to protect the system from dust and debris generated during installation of final finishes. The prefilters shall be changed out at least weekly and more frequently as project conditions dictate. The HEPA filters shall be changed out based on filter loading as determined by static pressure drop across the HEPA filters.

4. When all construction activities have been completed, the contractor shall provide a thorough cleaning (if necessary) of the entire air conditioning system, including, but not limited to, cleaning all ductwork, AHU casing and coils, and air distribution devices to put the entire system into a first class condition. The Architect will review the condition of the permanent air conditioning system for compliance with this requirement and shall be the final judge as to the cleanliness of the air conditioning system. If the system is found not to be clean, the contractor shall clean the system to the satisfaction of the Architect as described above.

H. All guarantees including manufacturer's warranties for the permanent system shall commence on the Date of Substantial Completion.

I. Provide without delay all electrical service required for the temporary heating and ventilating system (or permanent system when its use is desired).

2.5 TEMPORARY OVERHEAD PROTECTION:

A. Provide temporary protection at active entrances/exits during operations where work will be in progress overhead. Protection shall include temporary covered walkways and other methods necessary to protect non-construction personnel from damage or injury.

B. Provide all necessary measures to protect vehicles parked in the vicinity of the Contractor's operations from damage, particularly from over-spray during pressure washing and from painting operations.

2.6 PROJECT SITE SIGN

A. No project signs are allowed on this project except those approved by the owner.

PART 3 - EXECUTION

3.1 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Temporary Paving:
   1. Construct and maintain temporary roads and paving as required to adequately support the indicated loading and to withstand exposure to traffic during the construction period.
   2. Locate temporary paving for roads, storage areas and parking where the same permanent facilities will be located.
   3. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration and supervision.

END OF SECTION 01500

SECTION 01550 – INFECTION PREVENTION DURING CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Infection Prevention (IP) is imperative for all construction activities or projects. There are several requirements to implement that assist in maintaining infection prevention (IP) during construction and/or demolition. The requirements include, but are not limited to:

1. Containing the work area within a Construction Protective Barrier
2. Modifying HVAC operation with prior Owner consent
3. Reducing dust produced during demolition or construction activities
4. Intensifying housekeeping
5. Rescheduling work hours
6. Ante Room

B. A construction project typically uses IP requirements simultaneously; however certain requirements may be phased-in as project activities progress.

C. The General Contractor working with the subcontractors shall be responsible for following and implementing the IP plan that is required for each project. The IP plan is the total requirements outlined in this specification section, as well as any other project specific requirements identified in the project design documents, or by the Onslow Memorial Project Manager or designated project representative. The implementation of the IP plan is tracked by Owner observations and with the completed Project Monitoring Log found in Specification Section 01356.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION PROTECTIVE BARRIER - CPB

A. The construction area shall be physically separated from the remainder of the facility prior to the start of construction with a Construction Protective Barrier (CPB).

1. The CPB shall resist the passage of smoke and be erected as a “hard wall” material constructed of finished and painted gypsum wallboard, or of fire-rated melamine. The CPB shall be erected from floor to ceiling, and contain a positive latching smoke rated door with closer. With the Onslow Memorial Project Manager or designated project representative approval, you may utilize fire-retardant plastic as the CPB.
2. The finished “hard wall” partition shall have a flame spread index of 25 or less, and a smoke developed index of 450 or less, per current edition of ASTM E 84 testing requirements.
3. All corridor work shall be coordinated in advance with the Onslow Memorial Project Manager (PM) or designated representative.
4. To achieve and maintain the construction area negative pressure as specified below, the CPB may require that the above ceiling space be sealed with fire retardant plastic.

B. The CPB shall fully encircle the demolition or construction activities PRIOR to beginning any of these activities. The criteria for a satisfactory CPB are:

1. the barrier is constructed of the materials identified above and ASTM E 84 indices as specified,
2. the barrier encircles the construction area and fully separates it from the remainder of the facility, including the space above the ceiling as necessary,
3. the barrier holds the required negative pressure continuously without alarm,
4. the construction area returns to target negative pressure within no more than 60 seconds after the closing of a construction area access entry passageway, and
5. the protective barrier effectiveness is demonstrated to the Onslow Memorial PM or designated representative as satisfactorily accomplishing items 1) through 4).

C. Demolition or construction activities shall not occur prior to the CPB's effectiveness being demonstrated.

D. The CPB shall be in place and functioning satisfactorily the entire time that project demolition or construction activities are on-going. The Contractor shall monitor the project area's negative pressure across the CPB throughout the project duration. If at any time during the project, the CPB becomes unsatisfactory then **all** demolition or construction activities shall cease immediately, until such time that satisfactory service of the CPB is returned and demonstrated.

E. The Owner reserves the right to stop all demolition or construction activities at any time the CPB is not functioning satisfactorily.

3.2 PROJECT AREA AIR PRESSURE AND FILTRATION

A. Infection Prevention Monitoring procedures have been developed to prevent dust-borne infections related to air handling and environmental dispersion during construction, renovation, or maintenance projects in Onslow Memorial Hospital. The Contractor requirements for Infection Prevention Monitoring are included in this specification and in the Project Monitoring Log, which is attached to specification 01356, "Owner Requirements". It is the Contractor's responsibility to complete and maintain the Project Monitoring Log on a daily basis. Make or request additional copies of this log as required. This log is to be submitted with the Contractor's pay requests, or once a month, whichever is less. Invoices or pay requests submitted without the Project Monitoring Log, signed or initialed by the Onslow Memorial PM or designated representative will not be processed for payment.

B. The Contractor shall provide sufficient quantities of portable air scrubbers as required for maintaining negative air pressure inside the construction area relative to all adjacent spaces. Portable air scrubbers shall be Abatement Technologies Model PAS2400 or equal approved in advance by the Owner, capable of exhausting 700 CFM at low speed or 2,100 CFM at high speed; equipped with a 99.97% HEPA filter; 120 volt/single phase cord and plug connection. Provide flexible duct from each air scrubber for exhausting air to the outside of the building where possible. Use care and coordinate with the Owner to locate exhaust discharge to not interfere with or compromise operation of existing outside air intakes, pedestrian or vehicular traffic, patient room windows, or other sensitive locations. Scrubbers may be larger in size if required by the project size and requirements.

C. For smoke or fume control the Contractor may use a charcoal, or like material, filter in the scrubber units if this will proves to be effective. If required by smoke and fume producing activities such as welding, grinding, cutting, brazing, soldering, etc.; the Contractor shall provide and operate fume control units. These units shall conform to the minimum capabilities of a DIVERSI-TECH, Inc. Model "Fred Jr.", which is capable of collecting 1,200 cfm at 4,000 fpm pick-up velocity and is equipped with a carbon impregnated polyester gas absorber/HEPA filter as required.

D. Unless otherwise specified, this project requires differential pressure monitoring and shall use the Abatement Technologies Model PPM3 Portable Differential Pressure Monitor with wall hanger bracket (RPM-HANG). The Contractor shall provide the monitoring device and a source of power. The following device settings are required:

1. Interval logging: off
2. Alarm Delay: 180 seconds
3. Pressure Units: Pascal
4. Room Pressure -2.5 Pascal (or greater negative pressure if so identified in the project documents)
5. Job #: Provided by Project Manager

The Contractor is required to record pressure readings twice a day on the Project Monitoring Log.

E. Scrubbers and/or fume control units shall be cleaned and maintained to the following minimum standards. The contractor shall perform a daily visual inspection to assure compliance.

1. The exterior of the unit shall be cleaned to remove visible dust and dirt prior to being brought into a new project area. This exterior cleaning is also required prior to removing the unit from a project area through the existing facility.
2. All filters inside the unit shall be inspected by the Contractor prior to placing the unit into operation for each specific project. The Owner may also inspect all filters prior to service if the Project Manager deems this desirable. The filters shall be maintained continuously for the duration of the project.
3. The Contractor shall, and the Owner reserves the right, to inspect project scrubbers at any time during their use for this project. This inspection may include all features, components, filters, or instrumentation of the unit.
4. The Owner reserves the right to perform particle testing during demolition or construction activities to ensure the unit is functioning properly and/or that filters are effective.
5. If a unit is unsatisfactory, then the Contractor shall take steps to repair, upgrade, or replace the unit to restore satisfactory service to the construction area.

3.3 PROJECT AREA CLEANLINESS

A. The Contractor shall provide and use tacky mats at each access point (each side) through the CPB from the construction area into the facility. The tacky mats shall be kept fresh as to collect dust from the shoes of those exiting the construction area.

B. The consumption of food or drinks within the construction area shall be in designated areas only, if allowed by the Owner. All food wrappers and drink containers shall be disposed of with construction waste that is removed on a daily basis. Waste shall not be allowed to be placed throughout the construction area; nor within or on wall studs, duct, piping, counter tops, cabinets, etc.

C. Contractor shall perform an “in wall” inspection to assure trash/debris has been removed.

D. Carts used to remove waste and debris from the construction area, or to move materials into the construction area must contain a secure and fitted cover. Debris and construction waste shall be removed from the construction area on a daily basis. Carts shall be cleaned and covered prior to entering the facility and leaving the construction area. The cart and cover shall be wiped clean of visible dust or dirt with a wetted cloth or disposable wipe(s).

E. Attention to site cleaning is important to maintaining IP during construction. These specific actions shall be implemented with regard to controlling contaminants at the work site:

1. Suppressing dust with wetting agents or sweeping compounds.
2. Increase the cleaning frequency for dust.
3. Switch to a more efficient dust collection method. For example, use a damp rag, wet mop, or vacuum equipped with a high efficiency particulate filter or wet scrubber that will discharge less material back into the air than conventional vacuuming, sweeping, or dusting).
4. Ensuring that all surfaces (including higher ledges, behind furniture, and inside mechanical equipment) are kept clean. This can be facilitated before the start of renovation by either moving contents out of the work area or covering them.
5. Remove accumulated water and keep work areas dry (using dehumidification if necessary).
6. Vacuuming with HEPA filtered vacuum cleaners prevents aerolization of settled dust.
7. Protect porous materials such as insulation and sheetrock from exposure to moisture. Remove wet materials, either installed or uninstalled, from the project area. Installed materials that become wet shall be demolished and replaced with dry materials. Stored materials that become wet shall not be installed, but shall be immediately removed from the project area by the Contractor.

3.4 HVAC PROTECTION

A. All HVAC equipment and duct work shall be protected from collecting dust.

1. Includes but not limited to:

a) Covering the ends of stored or installed duct with plastic.

B. Specific HVAC protection requirements apply to the entire HVAC system, including return side, central filtration, and the supply side of the system.

C. The permanent HVAC system shall not be used during demolition or construction activities without advanced written approval from the Owner. If the permanent HVAC system is used during construction, the requirements and restrictions of this Specification Section 01550 shall apply and shall be fully implemented by the Contractor. For additional temporary HVAC requirements and restrictions, see Specification Section 01500, “Temporary Facilities”.

D. Return Side:

1. The return side of an HVAC system is, by definition, under negative pressure and thus capable of drawing in nearby construction dust.
2. When planning any construction project, the following items need to be considered:

a) When possible, the entire system should be shut down during heavy construction or demolition.

1) Coordinate any and all shutdowns with the Onslow Memorial Hospital PM and/or Facility Director.

b) The system should be isolated from the surrounding environment as much as possible (e.g., all tiles in place for a ceiling plenum, duct and air handler leaks repaired) to prevent induction of pollutants.
c) All return system openings in (or immediately adjacent to) the construction area should be sealed with plastic.
d) When the system must remain operational during construction, temporary filters shall be added where necessary (e.g., on the grilles to return airshaft).

1) All filters shall receive frequent periodic maintenance and be replaced as required by dust loading. The filter media shall be a minimum of MERV-8 and

shall be sealed tight to the device(s) protected without an airflow bypass around the filter media.

2) If return grilles are left in-service during construction, in addition to the above grille filter media, the augmentation of the AHU central filtration shall also be considered as outline below. The Onslow Memorial Hospital PM and/or Facility Director shall identify if AHU central filtration augmentation is required. This decision will be based on the number of grilles involved, the system layout, and the specific AHU.

3) If return grilles are left in-service during construction, ducts and diffusers shall be inspected upon completion of the work for the amount of deposited particulate present and cleaned where needed. If visible dust deposits are observed in the system from construction activities, duct cleaning shall be required as outlined below.

e) When the general system must remain operational, the heaviest work areas can still be dampered off or otherwise blocked if temporary imbalance of the return air system does not create a greater problem.

f) The mechanical room shall not be used to store construction or waste materials.

E. Central Filtration:

1. Where return grilles are left in-service during construction or major dust loading is expected to impact operating HVAC systems, consideration shall be given to upgrading the filter efficiency of pre-filters inside the AHU. The augmenting filter media shall be a minimum MERV-14.
2. If not specifically identified in the design documents, the Onslow Memorial Hospital PM and/or Facility Director shall identify if AHU central filtration augmentation is required. This decision will be based on duct system layout and the specific AHU involved.

F. Supply Side:

1. Diffusers, VAV boxes, and duct within the CPB shall be isolated if possible, but this shall be coordinated with the Onslow Memorial Hospital PM and/or Facility Director. Leaving the supply air diffusers operational during construction is not typically desirable.
2. When the system is off for the duration of construction, diffusers shall be sealed for protection. Ducts and diffusers shall be inspected upon completion of the work for the amount of deposited particulate present and cleaned where needed.
3. If visible dust deposits are observed in the system from construction, duct cleaning shall be required as outlined below.

G. Duct Cleaning:

1. An HVAC system has excessive dust or debris when, according to a "Surface Comparison Test" by dry wiping the interior duct surface with a clean cotton cloth resulting in a noticeable difference between the wiped and un-wiped surfaces or ventilation is restricted. A minimum of a 1,000 lumens light shall be used to illuminate the duct surface during comparison testing.
2. Cleaning the ducts and associated equipment during renovation shall be required when construction dust is observed on existing or new system surfaces.
3. A decision on how to clean the ducts should be based on a detailed inspection of the system. The Onslow Memorial Hospital PM and/or Facility Director shall have the final say regarding the necessity to clean ducts, and on the cleaning method.
4. Both highly specialized equipment and professional expertise shall be required to insure that dust is effectively removed and contained.
5. The sequence in which duct cleaning occurs in the overall construction process needs to be carefully considered to avoid recontamination.

H. Temporary HVAC:

1. When the permanent system is used for temporary heating, ventilating, and air conditioning the Contractor shall provide proper operation and maintenance of the heating, ventilating, and air conditioning plant until Substantial Completion. Such items shall consist of but not be limited to maintenance of temporary filters in all equipment to prevent accumulation of dust and dirt in coils, housings, etc.; temporary protection of ductwork from dust, dirt, etc., through the use of filters over duct openings or similar means; and prior to final inspection, replacement of temporary filters with new filters as specified. Provide a thorough cleaning of coils and other equipment of dust and dirt, putting the entire system into first class condition, including cleaning traps and devices and adjustment and renewal of any and all materials and/or equipment not functioning correctly.
2. The permanent air conditioning system may only be used as a temporary system if written approval is provided in advance by the Onslow Memorial Hospital PM and/or Facility Director and the following provisions must be adhered to:

   a) Permanent air conditioning system shall not be used until major dust producing activities are completed. Until that time, the contractor shall protect the air conditioning system including the AHU and all ductwork from construction dust and debris by, at a minimum, capping and sealing ductwork as it is installed and covering air distribution devices with plastic to prevent dust and debris from entering the system.
   b) Once major dust producing construction activities have been completed, the contractor shall submit a written request to the Onslow Memorial Hospital PM and/or Facility Director requesting that the permanent air conditioning system be turned on. The Onslow Memorial Hospital PM and/or Facility Director will then review the building conditions to determine if the project area is clean enough to allow the system to operate. If so, the system will be allowed to start. If not, the Contractor will make other provisions to maintain temperature and humidity control within the project. Onslow Memorial Hospital PM and/or Facility Director shall be the final judge as to the cleanliness of the project area and his decision regarding operation of the system is not open to debate.
   c) Once the permanent air conditioning system is allowed to operate, the Contractor shall maintain temporary filters over all return air inlets located in the project area and shall also provide prefilters and HEPA filters in the AHU to protect the system from dust and debris generated during installation of final finishes. The prefilters shall be changed out at least weekly and more frequently as project conditions dictate. The HEPA filters shall be changed out based on filter loading as determined by static pressure drop across the HEPA filters.
   d) When all construction activities have been completed, the Contractor shall provide a thorough cleaning of the entire air conditioning system, including, but not limited to, cleaning <u>all</u> ductwork within the CPB or associated with project, AHU casing and coils, and air distribution devices to put the entire system into a first class condition. The Architect and Onslow Memorial Hospital PM and /or Facility Director shall review the condition of the permanent air conditioning system for compliance with this requirement and Onslow Memorial Hospital PM and/or Facility Director shall be the final judge as to the cleanliness of the air conditioning system. If the system is found not to be clean, the Contractor shall clean the system to the satisfaction of Onslow Memorial Hospital PM and/or Facility Director as described above.
   e) HVAC system and equipment guarantees including manufacturer's warranties for the permanent system shall commence on the Date of Substantial Completion, even if the system and equipment was used as temporary HVAC during construction.

END OF SECTION 01550

SECTION 01560 – INTERIOR AIR QUALITY DURING CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Several options are available to maintain interior air quality (IAQ) during construction and/or demolition. The choices can involve, but not limited to:

1. Containing the work area;
2. Modifying HVAC operation;
3. Reducing emissions;
4. Intensifying housekeeping; or
5. Rescheduling work hours.

B. This project may use more than one of these measures (simultaneously or phased in) as renovation progresses.

C. The General Contractor working with the subcontractors shall be responsible for developing a written plan for Owner review prior to starting of the Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 HVAC PROTECTION

A. All HVAC equipment shall be protected from collecting not only dust but also odors (which can “stick” to porous materials in the system and later be released).

B. Specific HVAC protection requirements generally apply to either the return side, central filtration, or supply side of the system.

C. Return Side:

1. The return side of an HVAC system is, by definition, under negative pressure and thus capable of drawing in nearby construction dust and odor.
2. When planning any construction project, the following items need to be considered:
   a) When possible, the entire system should be shut down during heavy construction or demolition.
      1) Coordinate with the Owner.
   b) The system should be isolated from the surrounding environment as much as possible (e.g., all tiles in place for a ceiling plenum, duct and air handler leaks repaired) to prevent induction of pollutants.
   c) All return system openings in (or immediately adjacent to) the construction area should be sealed with plastic.
   d) When the system must remain operational during construction, temporary filters shall be added where necessary (e.g., on the grills to return airshaft).
      1) All filters shall receive frequent periodic maintenance and be replaced at end of project.
   e) When the general system must remain operational, the heaviest work areas can still be dampered off or other wise blocked if temporary imbalance of the return air system does not create a greater problem.
   f) The mechanical room should not be used to store construction or waste materials.

D. Central Filtration:

1. Where major dust loading is expected to impact operating HVAC systems, consideration should be given to upgrading the filter efficiency of pre-filters.
2. Where other control options for construction related odors are not deemed effective, consideration may be given to filtration with media such as activated charcoal or potassium permanganate.

E. Supply Side:

1. Diffusers, VAV boxes, and ducts may be adequately protected in most cases where the above measures are implemented.
2. When the system is off for the duration of construction, diffusers shall be sealed for protection. Ducts and diffusers shall be inspected upon completion of the work for the amount of deposited particulate present and cleaned where needed.
3. If visible dust deposits are observed in the system during construction, duct cleaning shall be required.

F. Duct Cleaning:

1. An HVAC system has excessive dust or debris when an accumulation of dust particles can be observed within the duct system, or ventilation is restricted.
2. Cleaning the ducts and associated equipment during renovation shall be required when dust is observed on existing or new system surfaces.
3. A decision whether and how to clean the ducts should be based on a detailed visual inspection of the system.
4. Both highly specialized equipment and professional expertise shall be required to insure that dust is effectively removed and contained.
5. The sequence in which duct cleaning occurs in the overall construction process needs to be carefully considered to avoid recontamination.

3.2 SOURCE CONTROL

A. The most effective type of pollution control is generally at the source. A variety of options may be available depending on the type of products and equipment needed for a given construction project.

B. Production Substitution:

1. In response to recent IAQ concerns, many manufacturers have been formulating or providing lower emitting products.
2. Low emitting products are provided by the following suppliers:
   a) Carpet
   b) Adhesives
   c) Paints
   d) Caulks
   e) Cleaning Solutions
   f) Wall Coverings
   g) Furniture.
3. Although solvent content is often reduced, air quality advantages may be limited.
   a) Product emission data is often available from manufacturers and can be stated either as total VOCs or by specific compound.
   b) The time period of the testing is important (emissions should be expected to decline).

4. The use of products emitting lower amounts of odor and VOCs may not be critical if the work area is isolated from building occupants and the space will be ventilated for several days before reoccupancy.
5. The advantages of lower emitting products are most evident under the following circumstances.
   a) Occupants are nearby while product is being applied or installed.
   b) Odor pathways exist from the work area to occupant space.
   c) Reoccupancy of the work area must occur very quickly (leaving insufficient time for the materials to offgas).

6. "Bake-outs" of new material is sometimes advocated as a control for offgassing. Heating of furnishings and construction materials is generally not recommended due to questionable effectiveness and potential for damages.

C. Modifying Equipment Operation:

1. Use of equipment may need to be restricted in order to meet IAQ objectives.
2. This could involve substituting cleaner equipment or simply changing operating procedures.
3. Examples of such controls include:
   a) Restricting traffic volume or prohibiting idling of motor vehicles where emissions could be drawn into occupied areas.
   b) Switching from diesel to bottled gas for equipment such as generators or forklifts (emissions are cleaner but still potentially harmful under some circumstances).
      1) Use of electric forklifts and other equipment should be considered when feasible, since they do not burn fossil fuels, thus eliminating exposure to combustion gas emissions.
   c) Switching equipment such as chain saws from gasoline-powered to electric (job may take longer due to reduced performance).
   d) Cycling equipment off when not needed.

D. Changing Work Practices:

1. For some demolition tasks (e.g., paint stripping) there may be techniques available, which produce less airborne dust.
2. Some painting techniques release less odor.
3. Some cleaning practices raise less dust (see pathway interruption).

E. Local Exhaust:

1. Pollution sources can be directly exhausted to the outside.
   a) This may be done through an exhaust system already available in the building or more often by a portable fan vented to the outside and attached to the work site by flex duct.
2. Depending on the nature of the material and the location of the exhaust, special filtration of the exhaust may or may not be necessary.
3. Any emissions to the outside must be in compliance with applicable regulations and should be directed well away from intakes.

F. Air Cleaning:

1. Where exhaust is not feasible, local re-circulation of air through a portable air cleaner may be effective.
2. The type of filter should be suitable for the material being controlled (e.g., charcoal or potassium permanganate for many odors, a moderate to high efficiency filter for dust).

G. Cover or Seal:

1. VOC emissions are a result of evaporation from an exposed surface. Reducing the exposed surfaces reduces emissions. For Example:
   a) Containers of wet products should be kept closed as much as possible.
   b) Waste material which can release odor or dust should be covered or sealed.
   c) A surface, which is a persistent odor source, may be controlled by applying a sealer.

3.3 PATHWAY INTERRUPTION

A. As an alternative to costly source controls or evacuation, practical methods are often available to simply prevent air movement from the work site to occupied space.

B. Interruption of potential contaminant pathways can thus be a very attractive control option.

C. Once major pathways are identified for a given project, five different factors may be manipulated to achieve environmental control:

1. Depressurize the work area.
   a) This can be accomplished by adjusting the balance of the existing HVAC and exhaust systems or installing portable exhaust fans.
   b) Construction work comfort may have to be a secondary consideration when cutting off conditioned air to the work site becomes necessary to help establish a negative pressure environment.
   c) Some ventilation of the construction space will still be needed to dilute contaminates.
   d) This may be provided by air drawn into the work site from adjoining areas.

D. Air exhausted to achieve negative pressure may or may not need to be filtered, depending on the nature of the materials, location of the exhaust, and any applicable regulations.

1. Care must be taken not to exhaust air where it can be drawn back into the building.

E. When increasing the amount of air supplied to the occupied space, it is imperative that the HVAC system itself remains protected from construction emissions.

F. As a general rule, the work site should be exhausted at a rate at least 10% greater than the rate of supply in order to maintain an effective negative pressure.

1. Pressurize occupied space:
   a) Increasing supply air and/or reducing return/exhaust air in building areas remaining occupied during construction will help exclude airborne dust and odors.
   b) When increasing the amount of air supplied to the occupied space, it is imperative that the HVAC system itself remains protected from construction emissions.
   c) Any temporary rebalancing during construction should be carefully planned and executed.
2. Erect barriers to contain construction area:
   a) Barriers can range from simple dust curtains for jobs generating only minor amounts of nuisance dust to a continuous plastic seal around the site, allowing for only the controlled inflow of make-up air (commonly required for asbestos removal).
   b) The extent of the barrier should be based on the materials involved and the implications of dust and odor escaping from the site.
   c) If such a release is not considered a hazard and can be easily corrected by housekeeping, then a partial barrier or sealing of holes may be sufficient.

d) When no odor or dust can be tolerated outside the work area, a barrier using gypsum board construction may be required.
e) Barriers must be designed in conjunction with favorable pressure differentials.
f) Pressurization can only be achieved with a real partition between areas with pressure differences.
g) In general, full containment of a work site with barriers, capping of return air ducts, and the application of negative pressure may be needed for spaces undergoing renovation.

3. Relocate pollutant sources:
   a) When project equipment or staging areas coincide with critical airflow pathways, IAQ problems can result. In some cases, equipment can simply be moved to a more favorable location in regard to air quality. For example, in a roofing job, tar kettles can be located as far away from intakes as possible.
   b) Mechanical equipment might be refurbished outside or in a shop in order to relocate emissions from the building.
   c) Special care must be taken to protect mechanical rooms with air handling equipment (e.g., store construction products and waste materials elsewhere).

3.4 HOUSEKEEPING

A. As dust accumulates at a construction site, it will become airborne when disturbed by nearby activity.

B. Similarly, spills or excess applications of products containing solvents will increase odors at a construction site.

C. Finally, leaving the work site wet or even just damp for more than a day could result in the growth of mold and bacteria.

D. Attention to site cleaning is, therefore, important to maintaining IAQ during construction. These specific actions may be applicable in regard to controlling contaminants at the work site:

1. Suppressing dust with wetting agents or sweeping compounds.
2. Increasing the cleaning frequency for dust.
3. Switching to a more efficient dust collection method (e.g., a damp rag, wet mop, or vacuum equipped with a high efficiency particulate filter or wet scrubber will discharge less material back into the air than conventional vacuuming, sweeping, or dusting).
4. Ensuring that all surfaces (including higher ledges, behind furniture, and inside mechanical equipment) are kept clean. This can be facilitated before the start of renovation by either moving contents out of the work area or covering them.
5. Removing spills of excess applications of solvent-containing products as soon as possible. Care should be taken as to selection of spot removers and cleaning agents near occupied areas (in general, products should be low odor emitters or used after hours with sufficient ventilation).
6. Removing accumulated water and keeping work areas as dry as possible (using dehumidification if necessary).
7. Vacuuming with HEPA filtered vacuum cleaners prevents aerolization of settled dust.
8. Protecting porous materials such as insulation from exposure to moisture (items, which remain damp for more than a few hours may need to be replaced).

3.5 SCHEDULING

A. Another control option is to ensure that construction activity and building occupancy do not overlap in time.

1. For many projects, the immediate work area is vacated to prevent safety hazards and work disruption.
2. Although reoccupancy may occur anytime after substantial completion of the Work, IAQ concerns may suggest waiting until detectable odors and dust are eliminated.
3. For many major renovation projects, a 48-hour period of continuous ventilation after final installation and cleaning will result in acceptable environment for reoccupancy.
4. Where possible, the renovation site should be maintained under negative pressure during this period to prevent odor migration into adjacent areas.

B. For some projects, vacating a buffer zone around the work area may also be needed to ensure that no odor or dust is detectable in the occupied space.

C. The size of such a buffer zone will depend on the potential air quality problems presented by the project, the availability of temporary space, and HVAC system zoning.

END OF SECTION 01560

SECTION 01631 - PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Specified This Section:

1. This Section specifies administrative and procedural requirements for handling requests as a substitution request made after the Notice to Proceed or award of the Contract as a CPR.

1.2 SUBMITTALS

A. Substitution Request Submittal:

1. Submit 3 copies of each request for substitution for consideration.
2. Submit each request on the attached form and in accordance with procedures required for Change Proposal Requests (CPR). See Section 01250 for additional information.
3. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
4. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
   a) Original copies of Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
   b) Samples, where applicable or requested.
   c) A detailed point by point comparison of the proposed substitution and the specified product detailing the significant qualities of both products.
      1) Significant qualities may include elements such as size, weight, durability, performance and visual effect.
   d) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
   e) A statement indicating the substitutions effect on the Contractor's Construction Schedule.
   f) Cost information, including a proposal of the net deduct change in the Contract Sum.
   g) Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated.
      1) Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

B. Architect's Action:
1. After receipt of the request for substitution, the Architect may request additional information or documentation necessary for evaluation of the request.
2. If a decision on use of a proposed substitute is not made or obtained within sufficient time to have no adverse impact on the construction schedule, the Contractor shall use the product specified in the Contract Documents.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SUBSTITUTIONS:

A. Conditions:

1. No substitution will be considered unless such request include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for a complete comparison with the specified products or materials and an evaluation of the proposed products or materials.
2. A statement setting forth changes in other materials, equipment or other portions of the Work including changes in the work of other contracts that incorporation of the proposed substitution would require shall be included.
3. Savings or Credit to Owner for accepting substitution
4. The burden of proof of the merit of the proposed substitution is upon the proposer.
5. In addition to the requirements in the Supplemental General Conditions, the following items will apply:
   a) The substitution is in compliance with subsequent interpretations of code or insurance requirements.
   b) The manufacturer or fabricator shall certify or guarantee the specified product as required by the Contract Documents.
   c) Product shall perform properly and fit in the designated space.

B. The Contractor shall bear all expenses resulting from substitutions including the cost of work in general, structural, plumbing, mechanical and electrical trades required due to the substitution and the cost of any Architect's services made necessary by the substitution.

C. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

3.2 SUBMITTAL FORMS:

A. All proposed substitutions shall use the following form.

SUBSTITUTION REQUEST

Project: _____ Substitution Request No_____

_____ CPR No. (After Bid) _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project No. _____

Re: _____ Contract For: _____

Specification Title/or Drawing Sheet:_____

Section No.: _____ Page No.: _____ Article/Paragraph:_____

Proposed Substitution: _____

Manufacturer:_____ Address:_____ Phone #:_____

Trade Name:_____ Model #:_____

Installer:_____ Address:_____ Phone #:_____

History: New Product: 2 -5 years old 5-10 years old More than ten years old

Briefly explain differences between proposed substitution and specified product _____

_____

_____

Point-by-Point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item: _____

_____

_____

Similar Installation:

Project:_____ Architect:_____

Address:_____ Owner:_____

Owner Representative:_____

Telephone:_____

Date Installed: _____

Proposed substitution affects other parts of Work: No Yes; explain _____

_____

_____

Savings or Credit to Owner for accepting substitution:_____($_____)

(MUST BE FILLED OUT TO RECEIVE REVIEW.)

Proposed substitution changes Contract Time: No Yes; Add/Deduct_____ days.

Supporting Data Attached:

Product Data	Drawings	Tests	Reports	Samples	_____
Fire Tests	Acoustical Tests				
ASTM Tests	UL, FM or WHI listed: provide copy of test reports.				

Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same or better warranty will be furnished for proposed substitution as for specified product.
- Same or better maintenance service and source of replacement parts, as applicable is available.
- Proposed substitution will not affect or delay Progress Schedule.
- Cost data as stated above is complete. Contractor (s) claims for additional costs related to accepted substitution, which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for A/E changes to building design, including architectural or engineering design, detailing, and construction costs caused by the requested substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted By: _____

Signature: _____

Firm: _____

Address: _____

_____

Telephone:_____ Approved By: _____ _____
General Contractor Date

Attachments: _____

_____

_____

ARCHITECT'S REVIEW AND ACTION

Substitution approved - Make submittals in accordance with Division One.

Substitution approved as noted - Make submittals in accordance with Division One.

Substitution rejected - Use specified materials.

Signed by: _____ Date: _____

Additional Comments Contractor Subcontractor Supplier Manufacturer A/E _____

_____

_____

_____

END OF SECTION 01631

SECTION 01731 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
2. Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.
3. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

    a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

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

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

1.4 QUALITY ASSURANCE

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

B. Operational Elements: Do not cut and patch the following 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.

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-protection systems.
4. Control systems.
5. Conveying systems.
6. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Equipment supports.
4. Piping, ductwork, vessels, and equipment.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1. Engage a recognized, experienced, and specialized firm to cut and patch the following materials.

a. Preformed metal panels.
b. Roofing.
c. Firestopping.
d. Exterior Finish System.

1.5 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

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

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

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas. Coordinate and obtain approval from the Owner prior to affecting any existing services.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete 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 Division 2 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.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION 01731

SECTION 01740 - FINAL CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included This Section:

1. This Section specifies administrative and procedural requirements for final cleaning at Substantial Completion.

B. Environmental Requirements:

1. Conduct cleaning and waste disposal operations in compliance with all laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
2. Burning or burying of debris, rubbish or other waste material on the premises shall not be permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents:

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General:

1. Employ experienced workers or cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a professional building cleaning and maintenance program. Comply with manufacturer's instructions.
2. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion for the entire Project or a portion of the Project:
   a) Remove tools, construction equipment, machinery and surplus material from the site.
   b) Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original condition.
   c) Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
   d) Broom clean concrete floors.
   e) Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required strictly following manufacturers written instructions.

f) Clean transparent materials, including mirrors and glasses in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
g) Remove labels that are not permanent labels.
h) Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration.
i) Carefully, remove all paint over "UL" and similar labels, including mechanical and electrical nameplates and doors and door frames. All labels shall be like new and readable.
j) Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
k) Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
l) Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grilles. Clean ducts, blowers, and coils if units were operated without filters during construction.
m) Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
n) Leave the Project clean and ready for occupancy.

END OF SECTION 01740

SECTION 01781 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included This Section:

1. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
   a) Inspection procedures.
   b) Project record document submittal.
   c) Operating and maintenance manual submittal.
   d) Submittal of warranties.

2. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

1.2 SUBSTANTIAL COMPLETION

A. General:

1. The Work or designated portion thereof will not be considered suitable for Substantial Completion until all systems are operational as designed; all designated or required governmental inspections or certifications have been made and posted, including those of the Division of Health Service Regulation, designated instruction of Owner's personnel in the operation of systems has been completed, and all final finishes are in place.
2. As a further condition of Substantial Completion, the Contractor(s) shall certify that all remaining work will be completed within 30 consecutive calendar days following the Date of Substantial Completion, and the failure to do so shall automatically reinstate the provisions for damages due the Owner as contained elsewhere in the Agreement or as provided by law for such period of time as may be required by the Contractor to fully complete the work whether the Owner has occupied the work or not.
3. Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and recommendation by the Architect, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as provided in the Contract Documents.

B. Forms:

1. All forms to be used shall be American Institute of Architect (AIA) forms.

C. Preliminary Procedures:

1. Advise Owner of pending insurance changeover requirements.
2. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
3. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
4. Deliver tools, spare parts, extra stock, and similar items.
5. Make final changeover of permanent locks and transmit keys to the Owner.
   a) Advise the Owner's personnel of changeover in security provisions.
6. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel.

a) Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

7. Complete final clean up requirements, including touch-up painting.
   a) Touch-up and otherwise repair and restore marred exposed finishes.

D. Inspection Procedures:

1. On receipt of a request for inspection for Substantial Completion, the Architect will either proceed with inspection or advise the Contractor(s) of unfilled requirements.
   a) The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
2. The Architect will repeat inspection when requested in writing by the Contractor and assured that the Work has been substantially completed and all items that were incomplete have been corrected.
3. Results of the completed inspection will form the basis of requirements for final acceptance.

E. Reinspection Procedure:

1. In the event that more than the two inspections by the Architect, described above are made necessary by the failure of the Contractor(s) to complete the work or to complete or correct items identified on the list of such items, a CPR will be established for re-inspection.
   a) The Contractor(s) shall reimburse the Owner for all costs incurred including the cost of the Architect's services made necessary thereby.
2. Upon completion of re-inspection, the Architect will prepare a Certificate of Substantial Completion, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for Substantial Completion.
3. If necessary, a CPR will be established for re-inspection will be repeated at the Contractor's expense and the amount deducted from his Application for Payment.

1.3 FINAL ACCEPTANCE

A. At the completion of the Project prior to receiving final payment, the Contractor shall furnish the Owner, through the Architect, properly signed and notarized waivers of lien from all subcontractors employed and material suppliers furnishing materials for the Project. Such waivers shall be submitted before final payment will be certified by the Architect to the Owner (AIA G706A).

B. Preliminary Procedures:

1. Before requesting final inspection for final payment, submit and complete the following (list exceptions in the request):
   a) Submit a copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and the list has been endorsed and dated by the Architect.
   b) Submit record drawings, maintenance manuals, final project photographs (if any), and similar final record information.
   c) Submit Consent of Surety to Final Payment (AIA G707).
   d) Guarantees, Warranties and Bonds.
   e) Keys and keying schedule.
   f) Spare parts and Maintenance Materials.
   g) Certificate of Insurance for Products and Completed Operations.
   h) Certificate of Occupancy if required.

i) All remnants required by the Contract Documents.
j) Any other items as required by the Architect and/or Owner.

1.4 RECORD DOCUMENT SUBMITTALS

A. General:

1. The Contractor(s) shall record on the Record Drawings maintained at the site all changes and selections made during construction and shall locate by dimensions showing actual field measurements of all major items which will be concealed in the completed Work.
   a) These items shall include underground piping and conduit beneath slabs-on-grade (or basement slabs), underground site utilities such as pipe, conduit, storm drainage, sewer, gas, water, medical gases, oil, and telephone etc. and items above hard ceilings such as duct, pipe, etc.
   b) Elevations are to be established at fifty foot intervals and at all changes in direction using bench marks or finish floor elevations.
2. Dimensions are to be taken from face of building lines to centerline of piping or conduit.
3. The Contractor will accurately locate all under floor services at slab on grade areas by dimension from building line or column centerlines.
   a) Elevations are to be established from finish floor lines.
4. Where new lines cross existing installed lines the location, size and type of line crossed shall be accurately recorded.
5. Where tie-ins to existing under floor lines are indicated the elevation of the tie-in point and dimensioned location shall be recorded.
6. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's reference during normal working hours.

B. Record Drawings:

1. Record drawings shall be provided to reflect changes in the Work and locations of concealed items for all trades including plumbing, mechanical, electrical, and general construction.
2. Mark the set, using red, to show the actual installation where the installation varies substantially from the Work as originally shown.
3. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings.
   a) Give particular attention to concealed elements that would be difficult to measure and record at a later date.
4. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
5. Note related Change Order numbers where applicable.

C. Record Specifications:

1. Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction.
   a) Mark these documents to show variations in actual Work performed in comparison with the text of the Specifications and modifications.
   b) Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
   c) Note related record drawing information and Product Data.

2. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.

D. Shop Drawings:

1. Deliver Contractor's approved copy of all shop drawings submitted during the course of the project.

E. Miscellaneous Record Submittals:

1. Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work.
2. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference.
3. Submit to the Architect for the Owner's records.

1.5 MAINTENANCE MANUAL AND INSTRUCTIONS

A. Contractor shall, prior to substantial completion of the Contract, deliver to the Architect one hard copy and one electronic copy in PDF format of a manual, assembled, indexed, and bound; presenting for the Owner's guidance, full details for care and maintenance of mechanical, electrical, and other equipment included in Contract.

1. Manuals shall include parts lists for each item of equipment furnished under the Contract.
   a) Provide MSDS sheets to be placed in each section of the manual for all products used.
2. Contractor shall, for this manual, obtain from Subcontractors, literature of manufacturers relating to equipment, including motors; also furnish cuts, wiring diagrams, instruction sheets, and other information pertaining to same that will be useful to Owner in overall operation and maintenance. Include also the name, address, and phone number of the nearest sales and service organization for each item.

B. General:

1. Organize the manual into separate Sections for each piece of related equipment.
2. Index all data as per the Table of Contents.
3. As a minimum each manual shall contain a title page, a table of contents, copies of Product Data, supplemented by drawings and written text.
4. The electronic copy shall be provided on a CD and shall be organized in the same manner as the hard copy binder described herein.

C. Binders:

1. Identify each binder on the front and spine, with the typed or printed title "OPERATION AND MAINTENANCE MANUAL", Project title or name, and subject matter covered.
2. Indicate the volume number for multiple volume sets of manuals.
3. The binders shall be white in color, hardcover, three ring notebook, with the name of the project.
4. Provide the number of binders required to properly contain all information required.

D. Drawings:

1. Where drawings or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind in with the text.
2. Where oversize drawings are necessary, fold the drawings to the same size as the text pages and use as a foldout.
3. If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a typewritten page indicating the drawing title, description of contents and drawing location at the appropriate location in the manual.

E. Protective Plastic Jackets:

1. Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment if required.

F. Text Material:

1. Where written material is required as part of the manual use the manufacturer's standard printed material, or if it is not available, specially prepared data, neatly typewritten, on 8-1/2" by 11", 20 pound white bond paper.
2. Such data called for under separate Sections of the Specifications, shall be included in the manual described in this Section.

G. Title Page:

1. Provide a title page in a transparent plastic envelope as the first sheet of each manual. Provide the following information:
   a) Subject matter covered by the manual.
   b) Name and address of the Project.
   c) Date of submittal.
   d) Name, address, and telephone number of the Contractor.
   e) Name and address of the Architect;
   f) Cross reference to related systems in other operating and maintenance manuals.

H. Table of Contents:

1. After the Title Page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.
2. Where more than one volume is required to accommodate data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.

I. General Information:

1. Provide a general information Section immediately following the Table of Contents, listing each product included in the manual, identified by product name.
2. Under each product, list the name, address, and telephone number of the Subcontractor or installer, and the maintenance contractor.
3. Clearly delineate the extent of responsibility of each of these entities.
4. In addition, list a local source for replacement parts and equipment.

J. Product Data:

1. Where manufacturer's standard printed data is included in the manuals, include only sheets that are pertinent to the part or product installed.
2. Mark each sheet to identify each part or product included in the installation.
3. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents.
4. Identify data that is applicable to the installation and delete references to information that is not applicable.

K. Written Text:

1. Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information.
2. Organize the text in a consistent format under separate headings for different procedures.
3. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.

L. Warranties, Bonds and Service Contracts:

1. Provide a copy of each warranty, bond or service contract in a separate hard copy manual for the information of the Owner's operating personnel. The separate manual shall be formatted with cover and title page as described for the operation and maintenance manual, except that the title shall read “WARRANTY MANUAL”.
2. Provide written data outlining procedures to be followed in the event of product failure.
3. List circumstances and conditions that would affect validity of the warranty or bond.

1.6 INSTRUCTIONS

A. The Owner's delegated representative shall be given personal instructions by trained personnel, in the care, use, maintenance, and operation procedures for each item.

1. This shall be done in accordance with, and in addition to, the above required manual.

B. Operating and Maintenance Instructions:

1. Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance.
2. If installers are not experienced in procedures, provide instruction by manufacturer's representatives.
3. Include a detailed review of the following items:
   a) Maintenance manuals.
   b) Record documents.
   c) Spare parts and materials.
   d) Tools.
   e) Identification systems.
   f) Control sequences.
4. As part of instruction for operating equipment, demonstrate the following procedures:
   a) Start-up.
   b) Shutdown.
   c) Emergency operations.
   d) Noise and vibration adjustments.

e) Safety procedures.
f) Economy and efficiency adjustments.
g) Effective energy utilization.

C. Maintenance Procedures:

1. Provide information detailing essential maintenance procedures, including the following:
   a) Routine operations.
   b) Trouble-shooting guide.
   c) Disassembly, repair and re-assembly.
   d) Alignment, adjusting and checking.

D. Operating Procedures:

1. Provide information on equipment and system operating procedures, including the following:
   a) Start-up procedures.
   b) Equipment or system break-in.
   c) Routine and normal operating instructions.
   d) Regulation and control procedures.
   e) Instructions on stopping.
   f) Shutdown and emergency instructions.
   g) Summer and winter operating instructions.
   h) Required sequences for electric or electronic systems.
   i) Special operating Instructions.

E. Servicing Schedule:

1. Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.

F. Controls:

1. Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.

G. Coordination Drawings:

1. Provide each Contractor's Coordination Drawings.
2. Provide as-installed color-coded piping diagrams, where required for identification.

H. Valve Tags:

1. Provide charts of valve tag numbers, with the location and function of each valve.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01781

SECTION 01788 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included This Section:

1. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
2. Specific requirements for warranties for the Work and products and installations that are specified to be warranted are included in the individual Sections of Divisions 2 through 16.
3. Certifications and other commitments and agreements for continuing services to Owner are specified in the Contract Documents.

B. Disclaimers and Limitations:

1. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign warranties with the Contractor.
2. At no time shall any warranties/guarantees be submitted to the Owner for this project which supercedes or voids any of the Owners rights as established by the state's General Statutes for which the project is located.
3. Failure of the Contractor and/or its suppliers, manufacturers and its sub-contractors to enter into such warranties as required by the Contract Documents shall be considered a breach of contract.

1.2 WARRANTY REQUIREMENTS

A. Related Damages and Losses:

1. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work. Do not reuse damaged materials.

1.3 SUBMITTALS

A. Written Warranties:

1. Submit written warranties to the Architect prior to Substantial Completion in a separate three ring binder. The Architect's Certificate of Substantial Completion designates a commencement date for warranties.
2. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and subcontractor, supplier or manufacturer.
3. Refer to individual Sections for specific content requirements, and particular requirements for submittal of special warranties.

B. Form of Submittal:

1. At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the Table of Contents of the Project Manual. Deliver all warranties to the Architect before or with the Request for Substantial Completion.

C. Reinstatement of Warranty:

1. When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.
2. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

D. Replacement Cost:

1. Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents.
2. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of Work through a portion of its anticipated useful service life.

E. Owner's Recourse:

1. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

F. Rejection of Warranties:

1. The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01788

SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets.
2. Solid-surfacing-material countertops.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including cabinet hardware.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets and other items installed in architectural woodwork.

C. Samples for verification:

1. Plastic laminates.
2. PVC edge material.
3. Solid-surfacing materials.
4. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of products.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
3. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
4. Softwood Plywood: DOC PS 1, Medium Density Overlay.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Manufacturer: Provide products, manufacturers, and colors indicated in the Finish Schedule and Legend in the construction drawings. (Wilsonart Wild Cherry #7054-60)

D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Available Manufacturers: Provide products, manufacturers, and colors indicated in the Finish Schedule and Legend in the construction drawings.

2.2 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, [100] [135] [170] degrees of opening self-closing.

C. Wire Pulls: Back mounted, solid metal 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter. Typical, unless otherwise noted.

D. Shelf Rests (inside casework boxes): BHMA A156.9, B04013; Knape & Vogt 346P ANO Shelf Supports.

E. Wall Shelf Supports for Solid Surface Shelves:

1. Provide for shelves mounted to walls (not within cabinets) at solid surface shelves
2. Product: SH-37 3-3/32" shelf bracket by Mockett, phone (800) 523-1269.
3. Finish: Satin Nickel

F. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
2. Satin Stainless Steel: BHMA 630.

G. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.3 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Adhesives, General: Adhesives shall not contain urea formaldehyde.

C. VOC Limits for Installation Adhesives: Installation adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Multipurpose Construction Adhesives: 70 g/L.
3. Contact Adhesive: 250 g/L.

D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement with through-color laminates. Contact cement with other laminates.

1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.4 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

D. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

E. Install glass to comply with applicable requirements in Division 8 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.5 PLASTIC-LAMINATE CABINETS

A. Grade: Custom.

B. AWI Type of Cabinet Construction: Flush overlay.

C. Reveal Dimension: 1/8 inch.

D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGL.
2. Vertical Surfaces: Grade VGS.
3. Edges: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.

E. Materials for Semiexposed Surfaces:

1. High-pressure decorative laminate, Grade VGS.

a. Open edges of Plastic-Laminate Shelves, inside and outside cabinets: PVC edge banding,0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade CLS.

F. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

G. Colors, Patterns, and Finishes: Provide products, manufacturers, and colors indicated in the Finish Schedule and Legend in the construction drawings

2.6 SOLID-SURFACING-MATERIAL COUNTERTOPS

A. Grade: Custom.

B. Solid-Surfacing-Material Thickness: 1/2 inch (13 mm).

C. Colors, Patterns, and Finishes: Provide products, manufacturers, and colors indicated in the Finish Schedule and Legend in the construction drawings.

D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

1. Fabricate tops with shop-applied edges of materials and configuration indicated.
2. Fabricate tops with shop-applied backsplashes and sidesplashes of materials and configuration indicated. At countertop installations between two end-walls, one sidesplash (most remote from lavatory) may be supplied loose.

3. Fabricate countertops with bullnose edges indicated in drawings
4. Fabricate countertop edge outside corners with 1-inch radius.

E. Fabricate openings and drill holes in countertops for plumbing fittings and accessories in shop.

F. Integral sinks:

1. Oval lavatory bowl: Wilsonart Model BV1512, linen white, with integral overflow.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation.

F. Cabinets: Install without distortion so doors fit openings properly and are accurately aligned. Adjust hardware to center doors in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
3. Seal countertop to wall with countertop manufacturer’s color-match sealant.

H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402

SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls and horizontal assemblies.
2. Penetrations in fire-resistance-rated smoke barrier walls.

1.3 ACTION SUBMITTALS

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

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

   a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
   b. Classification markings on penetration firestopping correspond to designations listed by the following:

      1) UL in its "Fire Resistance Directory."
      2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
      3) FM Global in its "Building Materials Approval Guide."

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. A/D Fire Protection Systems Inc.
2. Grace Construction Products.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.
7. Passive Fire Protection Partners.
8. RectorSeal Corporation.
9. Specified Technologies Inc.
10. 3M Fire Protection Products.
11. Tremco, Inc.; Tremco Fire Protection Systems Group.
12. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. Fire-resistance-rated walls include fire-barrier walls and smoke-barrier walls.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. Horizontal assemblies include floors.
2. F-Rating: At least 2 hour.
3. T-Rating: At least 2 hour, except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barrier Walls: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.

E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1. Permanent forming/damming/backing materials, including the following:
   a. Slag-wool-fiber or rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.
2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

D. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

F. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

G. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

H. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.5 WALL LABELING

A. Label all walls that are indicated on the drawings to be of smoke-resistant and/or fire-resistant construction.

B. Label wording shall match the wording used on the drawings in the “Legend” that describes the wall symbols used on the Life Safety Plans.

C. Labels shall be paint-stenciled letters, minimum 2 inches high. Color: red.

D. In areas with suspended or dropped ceilings, provide labels above the ceiling, typically between 6 inches and 24 inches above the ceiling, as appropriate for visibility. Provide labels approximately every 12 feet along the length of wall.

E. In non-public areas (mechanical rooms, electrical rooms, etc.) with no suspended or dropped ceiling, provide labels typically between 8 feet and 10 feet above the floor, as appropriate for visibility. Provide labels approximately every 12 feet along the length of wall.

F. Where the fire resistance or smoke resistance of a wall changes along the length of a wall, provide a red-painted vertical line at the location of the change, and provide appropriate labels on each side of the painted line to indicate the fire and smoke resistance rating and limits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Owner may engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 07841

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Latex joint sealants.

B. Related Sections:

1. Division 6 Section "Architectural Woodwork" for sealing joints between woodwork and countertops and walls.
2. Division 7 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
3. Division 8 Section "Glazing" for glazing sealants.
4. Division 9 Sections "Gypsum Board," “Shower Trays,” and “Composite Wall Panels” for sealing perimeter joints.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period:

a. Ten years from date of Substantial Completion for Silicone Sealants.
b. Five years from date of Substantial Completion for other Sealants.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period:

a. Ten years from date of Substantial Completion for Silicone Sealants.
b. Five years from date of Substantial Completion for other Sealants.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. For use at these locations:

1. At joints between Composite Wall Panels.
2. At joints between Shower Trays and Composite Wall Panels.

3. At joints between metal components and Composite Wall Panels
4. At joints between plumbing fixtures and adjacent components

B. Single-Component, 100% Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50.

1. Products: Subject to compliance with requirements, provide one of the following:

a. GE Supreme Silicone Kitchen & Bath Sealant (white)
b. Approved equal.

2.3 LATEX JOINT SEALANTS

A. For use at these locations:

1. At joints between Composite Wall Panels and Gypsum Wallboard.
2. At other joints not specifically noted elsewhere.

B. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF, paintable.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Building Systems; Sonolac.
b. Pecora Corporation; AC-20+.
c. Tremco Incorporated; Tremflex 834.

2. Color: White

2.4 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, and surface dirt.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
   a. Metal.
   b. Glass.
   c. Composite Wall Panels.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07920

SECTION 08311 - ACCESS 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. Access doors and frames for ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details**,** fire ratings, materials, individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES FOR CEILINGS

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

1. Access Panel Solutions.
2. Acudor Products, Inc.
3. Alfab, Inc.
4. Babcock-Davis.
5. Cendrex Inc.
6. Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.
7. Jensen Industries; Div. of Broan-Nutone, LLC.
8. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
9. Karp Associates, Inc.
10. Larsen's Manufacturing Company.
11. Maxam Metal Products Limited.
12. Metropolitan Door Industries Corp.
13. MIFAB, Inc.
14. Milcor Inc.
15. Nystrom, Inc.
16. Williams Bros. Corporation of America (The).

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. Non-Fire-Rated, Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: Williams Brothers Corporation Model WB-GP-100 series
2. Door: 14 Gauge steel with radius corners

3. Frame & Trim: 18 Gauge steel, 1-1/2" wide flange
4. Finish: Primed white baked enamel, paintable surface
5. Latches: Flush, stainless steel cam latch (opens with screwdriver)
6. Hinges: Fully concealed offset hinge.

2.2 MISCELLANEOUS MATERIALS

A. Frame Anchors: Same type as door face.

B. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
   1. Provide mounting holes in frames for attachment of units to metal or wood framing.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.4 FINISHES

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

B. Protect mechanical 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

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces.

C. Caulk the access door frame flange to the ceiling to eliminate any crack between the frame and the ceiling.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

SECTION 09111 - NON-LOAD-BEARING STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, bulkheads, and soffits.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 DESCRIPTION

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: G60 (Z180), hot-dip galvanized, unless otherwise indicated.

B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.

1. Steel Studs and Runners:

   a. Minimum Base-Metal Thickness: 20 Gauge, 0.0312 inch.
   b. Depth: As indicated on Drawings.

2. Dimpled Steel Studs and Runners:

   a. Minimum Base-Metal Thickness: 20 Gauge, 0.0312 inch.
   b. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
      2) MBA Building Supplies; FlatSteel Deflection Track
      3) Superior Metal Trim; Superior Flex Track System (SFT).
      4) Telling Industries; Vertical Slip Track.

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Fire Trak Corp.; Fire Trak System.
   b. Grace Construction Products; FlameSafe FlowTrak System.
   c. Metal-Lite, Inc.; The System.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 20 gauge, 0.0312 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 1-1/2 inches (38 mm).
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to [5] <Insert number> times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

   a. Type: Postinstalled, expansion anchor.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 2 inches (51 mm).

E. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation; Drywall Grid System.
c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install studs so flanges within framing system point in same direction.

1. Space studs as follows:

a. Single-Layer Application: 16 inches (406 mm).

B. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb unless otherwise indicated.
b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

C. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
5. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09111

SECTION 09250 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels For installation behind Composite Wall Panels at showers.

B. Related Requirements:

1. Division 9 Section "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support gypsum board panels.
2. Division 7 Section "Composite Wall Panels" for installation over cementitious backer units.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. Low-Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

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

1. CertainTeed Corp.
2. Georgia-Pacific Gypsum LLC.
3. USG Corporation.

B. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. CertainTeed Corp.; FiberCement BackerBoard.
   b. Custom Building Products; Wonderboard.
   c. James Hardie Building Products, Inc.; Hardiebacker.
   d. USG Corporation; DUROCK Cement Board.

2. Thickness: 1/2-inch nominal.
3. Mold Resistance: ASTM D 3273, score of 10.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:

   a. Cornerbead.
   b. Bullnose bead.

c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Moisture- and Mold-Resistant Type: At all locations except shower walls (Shower walls to receive Cementitious Backer Units, as noted below).

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.

2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at shower walls to receive Composite Wall Panels.

B. Where cementitious backer units abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

C. At showers, install cementitious backer units after installation of the shower trays.
    1. Position/shim cementitious backer units so that the backer unit extends over the edge of the shower tray and over the end of the shower tray's integral curb.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:
    1. Cornerbead: Use at outside corners.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
    1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
    2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
        a. Primer and its application to surfaces are specified in other Division 9 Sections.

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09250

SECTION 09310 – SHOWER TRAYS

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. Individual shower trays.

B. Related Requirements:

1. Section 07920 “Joint Sealants” for sealing shower trays to adjacent components.
2. Section 09312 "Composite Wall Panels” foe adjacent shower wall panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for shower trays.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For shower trays in maintenance manuals.

PART 2 - PRODUCTS

2.1 SHOWER TRAYS

A. General: Solid trays consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

B. Basis of Design: Cosentino Silestone Model “Doppio.”

1. Shower tray to be augmented with factory-laminated quartz sheet material to provide curb at shower entry edge of tray.

C. Nominal Size and Shape: Custom rectangular sizes based on field measurements of existing shower walls and drain locations.

D. Color: Provide color indicated in the Materials Finish Legend in the drawings.

E. Outlet: Coordinate outlet with existing drain piping.

F. Occupant Standing Surface: Slip resistant according to ASTM F462.

2.2 MISCELLANEOUS MATERIALS

A. Adhesive: Provide setting adhesive as recommended by the manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of sanitary drainage to verify compatibility of piping rough-in with shower tray outlet before shower installation.

B. Examine floor slab for suitable conditions where each shower tray will be installed.

C. Examine walls for suitable conditions where each shower tray will be installed. Verify that the perimeter edge of each shower tray is within 3/8-inch of the faces of the wall studs adjacent to the shower tray.

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

3.2 INSTALLATION

A. Install shower trays according to manufacturers' written instructions.

B. Set shower trays true and level in leveling bed of adhesive.

3.3 CONNECTIONS

A. Comply with traps and soil and waste piping requirements specified in Division 15.

3.4 CLEANING AND PROTECTION

A. After completing installation of shower trays, inspect and repair damaged finishes.

B. Clean shower trays with manufacturers' recommended cleaning methods and materials.

END OF SECTION 09310

SECTION 09312 - COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Composite Wall Panels for shower enclosures.
2. Composite Wall Panels as wainscoting in toilet/shower rooms.
3. Attachment components and accessories.

B. Related Sections:

1. Section 09250 "Gypsum Board" for substrate behind composite wall panels.
2. Section 07920 "Joint Sealants" for sealant materials used with composite wall panels.
3. Section 09310 “Shower Trays” for shower trays at the base of the shower panels.

1.2 ACTION 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 composite wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of composite wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, and accessories; and special details..

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Composite Wall Panels: 5 by 6 inches.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For composite wall panels to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001and ISO 14001 Certified.

B. Installer Qualifications: An employer of workers approved by panel manufacturer.

C. Source Limitations: Obtain each type of composite wall panel from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, composite wall panels, and other manufactured items so as not to be damaged or deformed. Package composite wall panels for protection during transportation and handling.

B. Unload, store, and erect composite wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Store composite wall panels vertically, covered with suitable weathertight and ventilated covering. Store composite wall panels to ensure dryness, with positive slope for drainage of water. Do not store composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. Do not allow storage space to exceed 120 deg F (49 deg C).

D. Retain strippable protective covering on composite wall panel for period of panel installation.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify room and shower dimensions by field measurements before composite wall panel fabrication.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of composite wall 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 materials beyond normal wear and tear from intended use.

2. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Composite wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

C. Fire Propagation Characteristics: Composite panel wall assembly passes NFPA 285.

D. Surface-Burning Characteristics: Provide composite panels that meet the following values when tested in accordance with ASTM E84:

1. Flame-Spread Index: Zero.
2. Smoke-Developed Index: Zero.

E. Fire Resistance: Composite panel wall assembly passes ASTM E119.

F. Ignition Resistance: Composite panel passes NFPA 268.

2.2 COMPOSITE WALL PANELS

A. Description: Large-format compact panels fabricated from mixture of proprietary inorganic materials using a 25,000 ton press and technology of sinterized particle (TSP) as standard with manufacturer, with applied mesh backing as required for handling and installation.

1. Basis-of-Design Product: Subject to compliance with requirements, provide the Cosentino North America, Dekton Panels as indicated in the Materials Finish Legend in the drawings, or comparable product by one of the following:

   a. Neolith.
   b. Porcelainosa USA.

2. Surface Texture: Smooth, flat finish.
3. Panel Thickness: 8 mm.
4. Colors: As indicated in the Materials Finish Legend in the drawings.

2.3 MISCELLANEOUS MATERIALS

A. Adhesive: Provide adhesive as recommended by the manufacturer.

B. Panel Sealants: See Section 07920 "Joint Sealants" for sealant materials used with composite wall panels.

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.

1. Examine substrates to verify that installation is within flatness tolerances required by composite wall panel manufacturer.

B. Examine roughing-in for components penetrating composite wall panels.

C. At showers, examine installation of the stainless steel recessed shower niche to verify proper projection from the substrate. The face of the niche edge is to be flush with or slightly recessed with respect to the face of the installed composite wall panel.

D. At showers, examine shower tray and cementitious backer unit installation to verify that the cementitious backer unit extends over the perimeter edge of the shower tray.

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

3.2 COMPOSITE WALL PANEL INSTALLATION

A. Adhere composite wall panels to substrates in accordance with manufacturer's written instructions in sizes and locations indicated on Drawings. Install panels with orientation as described in the Materials Finish Legend in the drawings.

B. To provide for proper sealant application, provide 1/8-inch to 3/16-inch gap in these loactions:

1. Between the top of the shower tray edge and the bottom edge of the composite wall panel.
2. Between adjacent composite wall panels.

C. Joint Sealers: Install sealants for watertight performance of composite wall panel and shower tray.

1. Prepare joints and apply sealants to comply with requirements in Section 07920 "Joint Sealants."

3.3 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as composite wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of composite wall panel installation, clean finished surfaces as instructed by panel manufacturer. Maintain in a clean condition during construction.

B. Replace composite wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 09312

SECTION 09313 – CERAMIC TILE

PART 1 - GENERAL

1.1 SUBMITTALS

A. Shop Drawings:

1. Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, movement joints, thresholds, ceramic accessories, and setting methods and details.

B. Samples:

1. Three full size samples of each tile specified on Material Finish Schedule.

C. Project Information:

1. Installation methods.

D. Contract Closeout Information:

1. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

1.2 QUALITY ASSURANCE

A. ANSI A137.1, 1988 - Specifications for Ceramic Tile.

B. TCNA (HB) - Handbook for Ceramic Tile Installation; Tile Council of North America, Inc.

C. ANSI A108, A118, and A136 Specifications for Installation of Ceramic Tile.

D. Maintain one copy each of applicable reference standards and specifications on site.

E. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

F. Single Source Responsibility:

1. Obtain each type and color of tile from a single source.
2. Obtain each type and color of mortar, adhesive and grout from the same source.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging until ready for installation.

B. Protect adhesives and liquid additives from freezing or overheating in accordance with manufacturer's instructions.

C. Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing or overheating.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not install adhesives in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation of mortar materials.

1.5 EXTRA MATERIALS

A. Provide 10 sq ft of each size, color, and surface finish of tile specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable tile and grout manufacturers:

1. Tile and Grout: Provide products indicated in Material Finish Legend in the drawings

2.2 TILE

A. General: Provide tile that complies with ANSI A137.1 for types, compositions and other characteristics indicated. Provide tile in the locations and of the types colors and pattern indicated on the Drawings and identified in the Schedule and the end of this Section. Tile shall also be provided in accordance with the following:

1. Factory Blending: For tile exhibiting color variations within the ranges selected under Submittal of samples, blend tile in the factory and package so tile taken from one package shows the same range of colors as those taken from other packages.
2. Trim Units: Matching bead, bull-nose, cove, and base shapes in sizes coordinated with field tile.

B. Setting materials: As required by installation Method, See Part 3.

C. Tile backer board: See Section 09250.

D. Shower waterproofing:

1. Schluter-KERDI fully-bonded sheet-applied waterproofing membrane and vapor-retarder designed for the direct application of tile, or approved equal.
   a. Applied to shower floor and walls.

2.3 TRIM AND ACCESSORIES

A. Ceramic Accessories: Same color and finish as adjacent field tile; same manufacturer as tile.

B. Install recessed toiletry shelf in showers of patient toilet rooms. Refer to Toilet and Bath Accessories, Section 10802

C. Tile to be full height on shower walls.

D. Wainscot height walls to have manufacturer's bullnose trim at top.

E. Non-Ceramic Trim: Material and finish, style and dimensions to suit application, for setting using tile mortar or adhesive; use in the following locations:

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1. Transition strip (threshold) at all toilet room door: complying with ASTM C 615
   a. Base:
      1) Daltile: Single Hollywood Bevel.
      2) Size: 4-inch wide x 1/2-inch high x width of door opening.
      3) Color: Carrara White Marble M701

F. Decorative Wall Corner Trim: Extruded aluminum, wide profile, decorative outside wall corner trim, with integral perforated anchoring leg for setting the strip into the setting material; height and material/finish as indicated.

1. Use at all wing walls and outside corners and edges of tile
2. Height: As required to suit application.
3. Material:
   a. Clear anodized aluminum.
4. As specified on the Material Finish Legend in the drawings.
5. Provide coordinating corner trim pieces.
6. Acceptable Products: Subject to compliance with requirements, provide one of the following:
   a. Schluter RONDEC (drawing designation: TT 1)

I. Setting Buttons: Plastic buttons of thickness required for joint size indicated to maintain uniform joint width.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that wall surfaces are free of substances which would impair bonding of setting materials, smooth and flat within tolerances specified in ANSI A137.1, and are ready to receive tile.

B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of setting materials to sub-floor surfaces, and are smooth and flat within tolerances specified in ANSI A137.1.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Remove any curing compounds or other contaminates.

C. Vacuum clean surfaces and damp clean.

D. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION - GENERAL

A. Install tile and setting materials in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCNA Handbook recommendations.

1. Similar to TCNA Tile Installation Method B422C-20 (existing floor slab is not depressed)

B. Build up and slope mortar bed as indicated in drawings.

C. Install shower waterproofing:

1. Provide fully-bonded installation in accordance with the waterproofing manufacturer’s instructions and the prescribed TCNA Tile Installation Method.
2. Coordinate with shower drain, See Division 15.

D. Provide crack isolation membrane method to isolate thin-set tile and stone from minor substrate existing or future cracking.

E. Lay tile to pattern indicated. Arrange pattern so that a full tile or joint is centered on each wall and that no tile less than 1/2 width is used. Do not interrupt tile pattern through openings.

F. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

G. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

H. Form internal angles square and external angles with TT 1 aluminum trim.

I. Install non-ceramic trim in accordance with manufacturer's instructions.

J. Install transition strip (threshold) at door opening.

K. Sound tile after setting. Replace hollow sounding units.

L. Allow tile to set for a minimum of 48 hours prior to grouting.

M. Grout tile joints. Use grout indicted on the Material Finish Schedule in the drawings.

N. Movement Joints and Other Sealant Usage:

1. Comply with TCNA EJ171.
2. Locate movement joints directly over the following substrate conditions:
   a. Changes in substrate material.
   b. At junctures of floors meet and walls and other restraining elements such as curbs, columns, bases, and wall corners.
   c. At inside corners of wall tile.
   d. At other locations recommended by TCNA EJ171 Movement Joint requirements.
3. Joint Width: In accordance with TCNA EJ171.
4. Provide sealant material at items penetrating tile work, unless otherwise indicated.
5. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
6. Fill joints around toilet fixtures with white silicone sanitary sealant. Refer to Section 07920.
7. Provide sealants and related materials in accordance with cited ANSI and TCNA requirements.

3.4 CLEANING

A. Clean tile and grout surfaces.

3.5 PROTECTION OF FINISHED WORK

A. Do not permit traffic over finished floor surface for 72 hours after installation.

B. Cover floors with kraft paper and protect from dirt and residue from other trades.

C. Where floor will be exposed for prolonged periods cover with plywood or other similar type walkways.

END OF SECTION 09313

SECTION 09512 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Acoustical tiles for ceilings.
2. Suspension systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6-inches- (150-mm-) in size.

C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Tile: Set of 6-inch square samples of each type, color, pattern, and texture.
2. Exposed Moldings and Trim: Set of 6-inch- (150-mm-) long Samples of each type and color.

D. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL TILES, GENERAL

A. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system from single source from single manufacturer.

2.1 ACOUSTICAL TILES

A. Products: Provide product of sizes, profiles, and colors indicated on the Materials Finish Legend in the drawings.

B. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical tiles treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Postinstalled expansion anchors.
b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5-mm-) diameter wire.

2.3 METAL SUSPENSION SYSTEM ACT-1

A. Basis-of-Design Product: Provide product and color indicated on the Finish Legend.

B. Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Cap Material: Aluminum cold-rolled sheet.
4. Cap Finish: Painted white.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

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

3.2 PREPARATION

A. Measure each ceiling area and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. General: Install suspension systems and acoustical panel ceilings to comply with ASTM C 636/C 636M and manufacturer's instructions.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.

1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.

3.4 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09512

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Resilient base.

1.3 ACTION SUBMITTALS

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

B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Provide products and colors indicated in the Materials Finish Legend.

B. Resilient Base Standard: ASTM F 1861.

1. Style: Cove base with toe.

C. Minimum Thickness: 0.125 inch.

D. Height: 4-inch.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. Preformed Corners: Install preformed corners (if used) before installing straight pieces.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 09653

SECTION 09656 – HEAT WELDED RESILIENT SHEET FLOORING

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 DESCRIPTION OF WORK

A. Work Included This Section:

1. Provide heat welded sheet vinyl flooring indicated on the Drawings and specified herein.
2. Provide integral prefabricated flash cove base including seaming, accessories, and adhesives where indicated on drawings or finish schedules.

1.3 QUALITY ASSURANCE

A. Manufacturer:

1. Provide resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.

B. Applicators

1. Applicators of integral prefabricated flash cove bases shall have a minimum of 3 years documented experience in the installation of resilient sheet flooring, and shall be certified by the manufacturer as an "approved installer", having received any and all training necessary. Submit documentation to the Consultant prior to commencement of work of this section.

C. Fire Test Performance:

1. Provide resilient flooring which complies with the listed fire test performance criteria as determined by an independent testing laboratory acceptable to authorities having jurisdiction.

D. Sheet Vinyl:

1. ASTM F 1913 for unbacked sheet vinyl.

E. Source:

1. Products for use on this Project shall be of one manufacturer.

1.4 SUBMITTALS

A. Samples:

1. Submit following samples of materials proposed for use:
   a) Vinyl:
      1) Three samples, 12 inches by 12 inches, of each color and pattern to be selected.

b) Integral Base Samples
   1) Submit 12-inch long sample(s) of prefabricated flash cove base(s).
   2) Produce samples in specified flooring materials and selected colors.
c) Accessories:
   1) Three 6 inch lengths of each of following:
   2) Heat welding bead of each color required.
d) Weld rod chart.
e) Heat welded seam samples.
   1) For each flooring product and welding bead color and pattern combination required; with seam running lengthwise and in center or 6 by 9 inch sample applied to a rigid backing and prepared by installer for this project.

B. Job Checklist:

1. Manufacturer's factory technician shall make a minimum of two (2) visits to the job site during the installation of all material.
2. Manufacturer shall submit to the Applicator, General Contractor, and the Architect a checklist indicating that all vinyl floor covering is being installed in accordance with manufacturer's printed instructions and in the locations indicated.

C. Moisture, Alkalinity and Adhesion (Bond) Testing:

1. Provide floor plans with the following indicated:
   a) Date of testing;
   b) Type of test performed;
   c) Graphic location of each test;
   d) Results of each test cross-referenced to the floor plan.

D. Seaming Diagram:

1. Provide seaming diagram prior to installation for review by Architect.

1.5 PRODUCT HANDLING

A. Delivery:

1. Deliver materials to project site in manufacturer's original packages, and with seals unbroken. Maintain package seals until time for installation.

B. Storage:

1. Store materials in clean, dry building in areas free from wetting.
2. Prior to installation, ambient temperatures are to be maintained within the range recommended by manufacturer.
3. Store rolls upright on raised platform.

1.6 ENVIRONMENTAL CONDITIONS

A. Sufficient electric power light, heat and water shall be furnished at application site to permit proper application of flooring materials.

B. Temperature in areas of application shall be maintained at minimum 70 degrees F at least 48 hours before installation begins and shall be kept at this minimum for an additional 48 hours after application.

1.7 MAINTENANCE

A. At completion of project, applicator shall furnish Owner with two sets of manufacturer's maintenance instructions.

PART 2 - PRODUCTS

2.1 WELDED SEAM SHEET VINYL (WSSV)

A. Manufacturers:

1. Provide products and colors indicated in the Materials Finish Legend in the drawings.

2.2 PREFABRICATED FLASH COVE BASE

A. Pre-Fabricated Cove Bases: fabricated from same materials and dye lots as resilient flooring, in maximum practical lengths, with 1½" x 1½" radius-formed aluminum reinforcing bonded to back of base material.

B. Basis of Design: FlashCove™ Prefabricated Bases Inc., Markham ON (800.334.5147), and as follows:

1. Riser: 4 inches at walls and full height of toe kick at cabinets.
2. Toe: 3 inches minimum.

C. Comparable products from other fabricators are acceptable; provide minimum 0.0320-inch thick aluminum reinforcing.

2.3 ACCESSORIES

A. Primer:

1. Primer, where required for concrete subfloors, shall be as recommended in writing by the Adhesive and Flooring Manufacturer.

B. Adhesives:

1. Low-emission adhesive shall be as recommended in writing by Flooring Manufacturer.
2. For Prefabricated Flash Cove Base: Low-VOC premium cove base adhesive, as recommended by the prefabricated flash cove base manufacturer.
3. Employ adhesives compatible with flooring and concrete floor slab treatments:
   a) See Section 03055 Penetrating Colloidal Concrete Treatment and Section 07261 Topical Moisture Vapor Mitigation System

C. Trowelable Leveling and Patching Compounds:

1. Latex-modified, Portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

D. Manufacturer’s vinyl weld rod.

E. Integral-Flash-Cove-Base Accessories:

1. Cap Strip: Square metal cap provided or approved by resilient sheet flooring manufacturer.
2. Corners: Metal inside and outside corners and end stops provided or approved by resilient sheet flooring manufacturer.

PART 3 - EXECUTION

3.1 CONDITION OF SURFACES

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.
3. Surfaces to receive resilient flooring shall meet minimum requirements established by manufacturer of flooring.
4. Do not start work until defects have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Concrete Substrates:

1. Prepare according to ASTM F 710.
   a) Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Alkalinity and Adhesion (Bond) Testing:
   a) Perform tests recommended by manufacturer.
   b) Proceed with installation only after substrates pass testing.

3. Moisture Testing:
   a) Perform insitu Percent Relative Humidity Test (% RH – ASTM F 2170).
   b) Testing should be at the rate of three tests per 500 square feet or less, and one test per each additional 500 square feet.
      1) Locate test sites on floor plans.
   c) Proceed with installation only after substrates have maximum relative humidity that is less than or equal to the manufacturer's acceptable levels for the flooring and adhesive to be used.
   d) Proceed with installation only after substrates pass testing.
   e) Submit all test results to Architect as detailed in Article 1.4 Submittals.

C. Remove substrate coatings and other substances that are incompatible with floor covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer.

1. Do not use solvents.

D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are same temperature as space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.

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

3.3 INSTALLATION

A. Subfloors:

1. Prior to installation, broom clean and vacuum all surfaces to be covered and inspect the subfloor. Start of sheet flooring installation will indicate acceptance of subfloor conditions and full responsibility for the completed work.
2. Lightly grind concrete subfloors with a terrazzo grinder to remove any trowel marks or other surface irregularities, which will telegraph to the sheet-flooring surface.
3. Apply concrete slab primer, if recommended by sheet flooring manufacturer, prior to application of the adhesive.

3.4 INSTALLATION OF UNDERLAYMENT

A. Trowelable Leveling and Patching Compounds underlayment shall be installed as required for proper floor tolerances.

1. Floor surfaces shall not vary more than 1/8 inch in any 1-foot dimension.
2. Recesses where partitions or other existing items have been removed shall be filled as recommended by underlayment manufacturer.

3.5 INSTALLATION OF PREFABRICATED FLASH COVE BASE

A. Welded Prefabricated Flash Cove base:

1. Dry-fit base; cut and fit material to required lengths. Miter-cut inside and outside corners.
2. Extend integral base into toe spaces, door reveals, and into closets and similar openings.
3. Scribe glue line on walls and floor at edge of base material.
4. Apply adhesive in full spread (100% coverage on two surfaces) for full length of base material. Apply base to wall surface straight and level.
5. Slide flooring manufacturer's integral cove cap behind base material.
6. Hand roll base material onto wall and floor surface, and remove all bumps, ripples, and fishmouths. Remove all excess adhesive.
7. Heat-weld all seams (vertical and horizontal) in base material.
8. Install metal corners at inside and outside corners.

3.6 INSTALLATION OF SHEET VINYL FLOORING

A. Welded Vinyl Sheet Flooring:

1. Unroll sheet vinyl floor covering and allow them to stabilize before cutting and fitting.
2. Lay out sheet vinyl floor coverings as follows:
   a) Maintain uniformity of floor covering direction.
   b) Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering direction.
3. Match edges of floor coverings for color shading at seams in compliance with the manufacturer's recommendations, such as reversing adjoining sheet of the same roll, so that abutting edges are from the same edge of the roll.
4. Butt tightly to vertical surfaces, thresholds, nosing and edgings.
5. Scribe as necessary around obstructions and to produce neat joints; lay tight, even and straight.

6. Extend sheet flooring into toe spaces, door reveals, and into closets and similar openings.
7. Maintain reference markers, holes, or openings that are in place of plainly marked for future cutting by repeating on the finish flooring as marked in subfloor.
   a) Use chalk or other non-permanent-marking device.
8. Place sheet flooring with adhesive cement in strict compliance with the manufacturer's recommendations.
9. Install sheet flooring on covers for telephone and electrical ducts, and other such items as occur within the finished resilient sheet floor areas.
   a) Maintain the overall continuity of color and pattern.
10. Adhere floor coverings to substrates using a full spread of adhesive applied to substrates to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
11. Tightly cement sheet flooring to sub-base without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.
12. All sides and end seams shall be heat welded with manufacturer's matching vinyl bead with manufacturer's approved heat welding equipment.
13. Heat Welded Seams:
    a) Comply with ASTM 1516.
    b) Rout joints and use welding bead to permanently fuse sections into a seamless floor covering.
    c) Prepare, weld and finish seams to produce surface flush with adjoining floor covering surfaces.
14. Place resilient edge strips tightly butted to sheet flooring and secure with adhesive.
15. Install edging strips at all unprotected edges of sheet flooring, unless otherwise shown.

3.7 CLEANING

A. Cleaning and Protection:

1. Remove any excess adhesive or other surface blemishes from sheet flooring.
2. Sweep and vacuum floor coverings thoroughly.
3. Damp-mop floor coverings to remove marks and soil.
   a) Do not wash floor coverings until after time period recommended by manufacturer.
4. Protect installed flooring from damage by use of heavy Kraft paper or other covering as recommended by flooring manufacturer.
5. Do not move heavy and sharp objects direct over floor coverings.

B. Finishing:

1. After completion of the project and just prior to the final inspection of the work, thoroughly clean floors and accessories using neutral cleaners as recommended by the sheet-flooring manufacturer.

3.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Furnish not less than 10 linear feet in roll form for each 500 linear feet or fraction thereof, of each product, color, and pattern of sheet flooring installed.
2. Deliver extra materials to Owner.

END OF SECTION 09656

SECTION 09910 - PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included This Section:

1. Work of this Section shall consist of providing all painting, as indicated on Drawings and as specified.
2. Term "Paint" as used herein, includes emulsion, enamels, paints, and other coatings used as prime, intermediate, or finish coats.

B. Related Work Specified Elsewhere:

1. Painting of Mechanical, Plumbing, and Electrical Work (Divisions 15 and 16).

C. Surfaces to be Painted:

1. Complete coverage of all exposed surfaces is intended. Without restricting the extent of the work to be performed, the work shall include, but is not limited to the following:
   a) Ferrous Metal:
      1) All exposed surfaces of all ferrous metal work which is not finished painted under other Sections.
   b) Gypsum Drywall:
      1) All exposed surfaces, interior.

D. Related Work Specified Elsewhere:

1. Shop coats on fabricated items.
2. Factory-applied finishes.

1.2 QUALITY ASSURANCE

A. Source:

1. Products for use on this Project shall be of one manufacturer unless noted specifically otherwise herein.

1.3 SUBMITTALS

A. Product Data:

1. For each paint system indicated.
   a) Include block fillers and primers.
2. Material List:
   a) An inclusive list of required coating materials.
   b) Indicate each material and cross-reference specific coating, finish system, and application.
   c) Identify each material by manufacturer's catalog number and general classification.

3. Manufacturer's Information:
   a) Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

1.4 PRODUCT HANDLING

A. Storage of Materials:

1. Paints and similar materials shall be delivered in original sealed containers that plainly show designated name, formulas, or specification number, batch number, color, date of manufacture, Manufacturer's directions, and name of Manufacturer.

B. Store all materials in single, heated space. Keep storage place neat and clean, and remove soiled or used rags, waste and trash from building.

1.5 ENVIRONMENTAL CONDITIONS

A. Cleaning Area:

1. Before painting is started in any area, it shall be broom cleaned and dust shall be removed from all areas to be painted.
2. After painting operations begin in a given area, room cleaning will not be allowed.
3. Cleaning thereafter shall be with commercial cleaning equipment.

1.6 PAINTING WORK

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Cleaning:

1. Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings.
2. Remove oil and grease before cleaning.
3. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation:

1. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
2. Provide barrier coats over incompatible primers or remove and reprime.

D. Prime Coats:

1. Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others.
2. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Paint properly prepared surfaces.

1. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces.
2. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
3. Provide two coats of paint as specified on Drawings or herein.

1.7 PROTECTION

A. Drop Cloths:

1. Protect adjacent areas and installations by use of drop cloths or other approved precautionary measures.

B. Hardware and Fixtures:

1. Remove and protect hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items; or provide ample in-place protection.
2. Upon completion of each space, carefully replace all removed items.
3. All painting work shall be done only by skilled mechanics, using adequate tools for work to be done.
4. Protect plumbing fixtures and trim.
5. Standing on fixtures shall be prohibited.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the specifications, provide products from one of the following:

1. Duron Paints/Duron, Inc. (Duron)
2. Devoe Paints
3. Sherwin-Williams

2.2 PAINT MATERIALS

A. Paint shall arrive at project site, ready-mixed, except for tinting of undercoats, and thinning, if directed by Manufacturer's printed instruction and allowed by the Architect.

B. Tinting materials shall be as recommended by Manufacturer for particular materials to be tinted.

2.3 THINNER

A. Type and product recommended by manufacturer of finishing material.

B. Turpentine:

1. Pure gum spirits of turpentine, ASTM Specification D 13.

C. Mineral Spirits:

1. ASTM Specification D13.

2.4 APPLICATION EQUIPMENT

A. Equipment shall be adequate and in keeping with work and workmanship required herein.

PART 3 - EXECUTION

3.1 INSPECTION OF SURFACES

A. Before starting any work, examine surfaces to receive paint finish for defects, which cannot be corrected by procedures specified under “Preparation of Surfaces”, and which might prevent satisfactory results.

1. Do not proceed with work until such conditions are corrected.

3.2 PREPARATION OF SURFACES

A. Verify Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Gypsum Board: 12 percent.

B. Paints shall be applied only to surfaces that are completely free of surface moisture as determined by sight or touch. In no case shall paint be applied to surfaces upon which there is visible frost or ice.

C. Previously Painted Surfaces:

1. Surfaces shall be thoroughly cleaned prior to painting.

3.3 APPLICATION

A. Method of Application:

1. Brush or rollers shall apply all paint in accordance with manufacturer's recommendations.

Sequence of Coats:

2. Allow sufficient time between successive coats to permit proper drying.
3. If Architect so directs, succeeding coats shall not be applied until he has had opportunity to inspect completed coat.

B. Quantity of colors:

1. Provide colors as indicated in the Materials Finish Legend in the Drawings.

C. General Requirements for Workmanship:

1. Coverage and hide shall be complete.
   a) Where color, stain, dirt, or undercoats show through final coat of paint, surface shall be covered by additional coats until paint film is of uniform finish, color, appearance, thickness, and coverage, at no additional cost to Owner.
2. Give special attention to insure that edges, corners, crevices, welds, and rivets receive film thickness equivalent to that of adjacent painted surfaces.
3. Rate of application shall not exceed average rate of coverage recommended by Manufacturer for type of surface involved.
4. Finished surfaces shall be free from runs, drops, ridges, waves, laps, sags, brush marks; and free of variations in color, texture and finish.

D. Workmanship for Interior Painting;

1. Refinish a whole wall rather than spot-finish where a portion of the finish has been damaged or is unsatisfactory.
2. Remove electrical panel box covers and doors before painting wall. Paint separately and reinstall after all paint is dry.

3.4 PAINTING SCHEDULE

A. Painting Schedule - Interior

1. Ferrous Metal
   a) Primer (if not previously painted):
      1) One (1) Coat:
         (a) Duron: Dura Clad Alkyd Metal Primer White 33- 010.
         (b) Devoe: 4120 Devguard All-Purpose Metal & Galvanized Primer.
         (c) S-W: Kem Kromik Universal Metal Primer, B50Z Series.
   b) Finish: (Latex)
      1) Two (2) Coats:
         (a) Duron: Plastic Kote Interior Acrylic Semi-gloss Enamel 122- Series.
         (b) Devoe: 4205 Devflex Acrylic Latex Semi-Gloss Enamel.
         (c) S-W: ProMar 200 Latex Semi-gloss Enamel.

2. Gypsum Board Walls and Ceilings, Eggshell (100% Acrylic System)
   a) Primer:
      1) One (1) Coat:
         (a) Duron: Interior Acrylic Latex Drywall Primer, 04-124.
         (b) Devoe : LM9116 Prep & Prime Odor-Less Water-Based Primer-Sealer.
         (c) S-W: PrepRite High Build Interior Latex Primer/Surfacer B28W601.
   b) Finish: (Eggshell)
      1) Two (2) Coats:
         (a) Duron: Genesis Interior Odor Free Acrylic Latex Low Sheen Enamel, 79-Series.
         (b) Devoe: LM9300 Lifemaster 2000 Eggshell.
         (c) S-W: ProMar Interior Latex 200 or 400 (B30W200 or B30W400) or Health-Spec Eggshell.

3. Gypsum Board Walls and Ceilings, Semi-gloss (100% Acrylic System):
   a) Primer:
      1) One (1) Coat:
         (a) Duron: Interior Acrylic Latex Drywall Primer, 04-124.
         (b) Devoe: LM9116 Prep & Prime Odor-Less Water-Based Primer-Sealer.
         (c) S-W: PrepRite 200 latex primer B28W200 OR
         Harmony low odor, NO VOC primer B11W900
   b) Finish:
      1) Two (2) Coats:
         (a) Duron: Genesis Interior Odor Free Acrylic Latex Low Sheen Enamel, 79-Series.
         (b) Devoe: Dulux Professional 1406, Semi-gloss.
         (c) S-W: ProMar Interior Latex 400 Semi-gloss.

4. Gypsum Board Walls and Ceilings, Semi-gloss, Epoxy:
   a) Primer:
      1) One (1) Coat:
         (a) Duron: Interior Acrylic Latex Drywall Primer, 04-124.
         (b) Devoe: LM9116 Prep & Prime Odor-Less Water-Based Primer-Sealer.
         (c) S-W: PrepRite 200 latex primer B28W200 OR
         Harmony low odor, NO VOC primer B11W900
   b) Finish:
      1) Two (2) Coats:
         (a) S-W: Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-gloss

END OF SECTION 09910

SECTION 10265 - IMPACT-RESISTANT WALL PROTECTION

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. Work Included this Section:

1. This section includes the following:
   a) High-impact Wall Coverings.
   b) Corner Guards.
   c) Handrails

1.3 SUBMITTALS

A. Product Data:

1. Include physical characteristics, such as durability, resistance to fading, and flame resistance, for each impact-resistant wall protection system component indicated.

B. Shop Drawings:

1. Provide plans at 1/8 inch = 1’- 0” scale (minimum) to show locations, extent, and installation details of each impact-resistant wall protection system component.
   a) Show methods of attachment to adjoining construction.
2. Show wall protection systems, include required heights, and indicate where protection stops and starts at plumbing fixtures, faceplates, cabinets, and other equipment.

C. Samples:

1. For the following products, showing the full range of color and texture variations expected in each impact-resistant wall protection system component.
   a) Prepare samples from the same material to be used for the work.
2. Wall/Corner Guards:
   a) 24-inch long samples of each type of impact-resistant wall protection system component required.
   b) Include examples of joinery, corners, and field splices.
3. Sheet or Panels:
   a) 12 inch by 12-inch square samples of each impact-resistant wall protection system component required and associated trim pieces.
4. Provide written proof of same date code or dye lot for all products on this project, including extra stock.

D. Material Test Reports:

1. From a qualified testing agency indicating compliance of each impact-resistant wall protections system component with requirements indicated, based on tests performed by testing agency within the past five years.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. An experienced installer who has completed installation of impact-resistant wall protection system components similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations:

1. Obtain each color, grade, finish, and type of impact-resistant wall protection system component from a single source with resources to provide components of consistent quality in appearance and physical properties.

C. Product Options:

1. Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection system and are based on the specific system indicated.
2. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architects approval.

D. Fire-Test-Response Characteristics:

1. Products shall be UL tested, classified and labeled indicating compliance with requirements for flame and smoke development of U.L. Test No. 723; no other fire test data will be accepted.
   a) Flame Spread:
      1) 25 or less.
   b) Smoke Developed:
      1) 450 or less.
2. Rated self-extinguishing when tested as per ASTM D635.

E. Impact-Strength:

1. Provide impact-resistant wall protection system components with a minimum impact resistance of width when tested according to ASTM D256, Test Method A:
   a) 25.4 ft-lbf/in. for rigid vinyl plastic.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store wall surface-protection materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within the storage area at not less than 70 degrees F during the period plastic materials are stored.
2. Keep sheet material out of direct sunlight to avoid surface distortion.
3. Store rigid plastic corner-guard covers in a vertical position, and rigid plastic wall guard and handrail covers in a horizontal position for a minimum of 72 hours, or until the plastic material attains the minimum room temperature of 70 degrees F.

1.6 PROJECT CONDITIONS

A. Environnemental Limitations:

1. Do not install wall surface-protection system components until the space is enclosed and weatherproof and ambient temperature with the building is maintained at not less than 70 degrees F for less than 72 hours before beginning installation.
2. Do not install rigid plastic wall surface-protection systems until that temperature has been attained and is stabilized.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

1. Provide products, colors, and textures indicated in the Materials Finish Legend in the drawings.

2.2 MATERIALS

A. Extruded Rigid Plastic:

1. Textured, chemical and stain-resistant, high-impact-resistant, PVC or acrylic-modified vinyl plastic; thickness as indicated.

B. Plastic Sheet Wall Covering Material:

1. Semirigid, textured, chemical- and stain-resistant, high-impact-resistant, PVC or acrylic-modified vinyl plastic sheet; thickness as indicated.

C. Aluminum Extrusions:

1. Provide alloy and temper recommended by the manufacturer for the type of use and finish indicated, but with not less than the strength and durability properties specified in ASTM B 221 (ASTM B 221M) for alloy 6063-T5.

D. Fasteners:

1. Provide aluminum, nonmagnetic stainless steel, or other non-corrosive metal screws, bolts, and other fasteners compatible with aluminum components, hardware, anchors, and other items being fastened.
2. Use theft proof fasteners where exposed to view.

E. Adhesive:

1. Low emission type recommended by the manufacturer for use with material on the substrate indicated.
2. Use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a) Gypsum Board and Panel Adhesives:
      1) 50 g/L.
   b) Multipurpose Construction Adhesives:
      1) 70 g/L.
   c) Contact Adhesive:
      1) 250 g/L.

2.3 PLASTIC CORNER GUARDS

A. Surface-Mounted, Resilient Plastic Corner Guards:

1. Surface-mounted, resilient plastic corner-guard assembly consisting of a snap-on-type plastic cover installed over a continuous aluminum retainer, height as indicated.

B. Cover:

1. Extruded, rigid plastic, minimum 0.078 inch thick, in dimensions and profiles indicated.

C. Corner Radius:

1. 1/4 inch.

D. Retainer:

1. Continuous, one-piece, extruded-aluminum retainer; minimum 0.062 inch thick.

E. Accessories:

1. Provide prefabricated, injection-molded top cap and aluminum base with concealed splices, cushions, mounting hardware, and other accessories as required.
2. Top caps shall match color of plastic covers and shall be field adjustable for close alignment with snap-on plastic covers.

2.4 HANDRAILS

A. Impact-Resistant Plastic Handrails: Assembly consisting of snap-on plastic cover installed over continuous retainer.

1. Cover: Minimum 0.078-inch- (2.0-mm-) thick, extruded rigid plastic; as follows:

   a. Single Handrail over Bumper-Rail: 1-1/2-inch- (38-mm-) diameter handrail tube mounted above nominal, flat-faced bumper rail; supported by concealed, continuous retainer and extended mounting brackets.

      1) Overall handrail and bumper-rail height: Nominal 6 inches.
      2) Bumper Surface: Smooth .

2. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
3. Mounting Bracket: Extended mounting on manufacturer's standard mounting brackets.
4. End Caps and Corners: Prefabricated, injection-molded plastic; matching color of cover; field adjustable for close alignment with snap-on cover.
5. Accessories: Concealed splices, cushions, and mounting hardware.

2.5 HIGH-IMPACT WALL COVERINGS

A. Semi-rigid Sheet Wall Covering:

1. Semi-rigid, embossed, fiber-backed, impact-resistant plastic sheet.
2. Sheets shall comply with fire-test-response characteristics specified and be chemical and stain resistant.
3. Provide manufacturer's standard; match moldings and trim as required.
4. Sheet Size:
   a) 48 by 120 inches.
5. Sheet Thickness:
   a) 0.060 inches.

B. Adhesive:

1. Type recommended by the manufacturer for use with material on the substrate indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions in which impact-resistant wall protection system components and impact-resistant wall covering materials will be installed.

B. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.

C. Impact-Resistant Wall Covering Materials:

1. Wall surfaces to receive impact-resistant wall covering materials shall be dry and free from dirt, grease, loose paint, and scale.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General:

1. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Install impact-resistant wall protection system components level, plumb, and true to line without distortions.

B. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

C. Install aluminum retainers, mounting brackets, and other accessories according to the manufacturer's written instructions.

1. Where splices occur in horizontal runs of more then 20 feet, splice aluminum retainers and plastic covers at different locations along the run.

D. High Impact Wall Covering:

1. Splice sheet goods at equal spacing between doors and/or partitions.

3.4 ADJUSTMENT AND REPAIR

A. Inspection:

1. Inspect system components for proper fit.
2. Adjust, repair or replace components not confirming to requirements.
3. Adjust installed end caps necessary to insure tight seams.
4. Repair or replacement of an individual unit shall be as approved by the Architect.

3.5 CLEANING

A. General:

1. Immediately on completion of installation, clean plastic covers and accessories using a standard ammonia-based household-cleaning agent.
2. Clean metal components according to the manufacturer's written instructions.
3. Remove excess adhesive using methods and materials recommended by the manufacturer.
4. Remove surplus materials, rubbish, and debris resulting from installation on completion of work and leave installation areas in neat, clean condition.

3.6 PROTECTION

A. Procedures:

1. Advise the contractor of procedures required to protect the finished work from damage during the remainder of the construction period.

B. Damage to Finished Work:

1. Finished units shall be without damage.
2. Damage shall be repaired at no charge to the Owner.

END OF SECTION 10265

SECTION 10810 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work Included This Section:

1. Provide toilet and bath accessories as shown on Drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. Source:

1. Products for the same function shall be of one manufacturer, unless noted specifically otherwise elsewhere in the Contract Documents.

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit schedule showing name of manufacturer, manufacturer's product designation and number, types, location arrangement, dimension, materials, finishes, and anchorage of various items required.
2. Submit schedule accompanied by manufacturer's catalog cuts and specifications to supplement information in schedule.
3. Cross-reference selected manufacturer with specified manufacturer by product number.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver items in manufacturer's original unopened protective packaging.

B. Store materials in original protective packaging to prevent physical damage, or wetting.

C. Handle so as to prevent damage to accessories.

1.5 WARRANTY

A. Furnish one-year guarantee against defects in material and workmanship on all accessories. In addition to the above the following shall apply:

1. Welded stainless steel framed mirrors shall have a fifteen-year guarantee against silver spoilage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

1. Subject to compliance with requirements, provide accessories by one of the following:
   a) Toilet and Bath Accessories:
      1) Bobrick Washroom Equipment, Inc. (Basis-of-Design, unless noted otherwise).
      2) McKinnney Washroom Accessories.
      3) ASI.

4) Bradley.
5) Gamco.
6) Design House (Robe Hooks)
7) Transolid (Recessed Shower Niche)
8) Preferred Bath Accessories, Inc. (Shower Grab Bars)

2.2 MATERIALS

A. Face flanges and frames shall be drawn, with no visible joints.

B. All exposed fasteners shall be spannerhead screws and of the same material as the accessory unit. All concealed fasteners shall be of galvanized steel.

C. All cabinets shall be constructed of 18-8, type 302/304 stainless steel with polished No.4 finish, 0.034-inch (22-gage) minimum thickness.

D. All tumbler locks to be fastened to accessories with lock nuts. Fastening locks to units with spring clips is not acceptable.

E. Mirror glass, nominal 6.0-mm (0.23-inch) thick conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Items shall be securely anchored in place, straight, plumb and level and in accordance with manufacturer's written installation instructions at heights and locations shown on Drawings.

1. Where heights and locations are not shown, accessories shall be located as directed by Architect.

B. Install items with non-corrosive anchoring devices.

C. Installation methods shall conform to manufacturers recommendations for backing and proper support.

D. Fit flanges of accessories snugly to wall surfaces.

E. Accessories with tumbler locks shall be keyed alike.

F. Install grab bars to withstand a dead load of at least 250 lbf, as per ASTM F 446.

G. Coordinate installation of the recessed shower niche with the installation of the cementitious backer units (section 09250) and the composite wall panels (section 09312)

3.2 ADJUSTMENT AND CLEANING

A. Upon completion of the work, or when directed, remove all traces of protective coatings or paper. Leave surfaces clean and free from damage and soil. Replace damaged products with new.

B. Adjust accessories for proper operation. Test mechanisms, hinges, locks and latches and where necessary adjust and lubricate.

C. Clean and polish exposed surfaces in accordance with manufacturer's written instructions prior to final installation.

D. Deliver accessories schedule, keys, and parts manual as part of project closeout documents. For owner's permanent records, provide two sets of the following items of manufacturer's literature:

1. Technical data sheets of each item used for the project.
2. Service and parts manuals.

3.3 TOILET ACCESSORY SCHEDULE

A. The following items will be furnished by the Owner and installed by the Contractor: Verify the location for installation of these items with the Owner.

1. Paper towel dispensers
2. Soap Dispensers
3. Sanitizer Dispensers

B. The following items are to be provided by the Contractor:

1. Recessed Shower Niche: Transolid Model STH1414-SS (Available at Lowe's)
2. Surface-mounted Toilet Tissue Dispenser: Bobrick B-6867
3. Water Closet Grab Bars: Bobrick 68 Series.
   a. See drawings for lengths and configuration.
4. Shower Grab Bars: Preferred Bath Accessories, Inc.: 6000 Balance Collection Series.
   a. Satin Stainless Finish
   b. See drawings for lengths and configuration.
5. Robe Hook: Design House #560342, satin nickel (Available at Home Depot)
6. Shower Curtain Rod: Bobrick B-207 × various lengths
7. Vinyl Shower Curtains:
   a. At openings up to 38″ Wide: Bobrick B-204-2 (42" wide)
   b. At openings greater than 38" wide: Bobrick B-204-3 (72" wide)
8. Shower Curtain Hooks: Bobrick B-204-1
9. Towel Bar: Bobrick B-6747 x 24
10. Mirror: Bobrick B-290 1836: 18″ W x 36″ H

    (See electrical drawings for description of integrally-lighted mirrors)

END OF SECTION 10810

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes general administrative and procedural requirements for mechanical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 01:

1. Submittals.
2. Coordination drawings.
3. Tests and inspections.
4. Record drawings.
5. Operation and maintenance manuals.
6. Rough-in.
7. Access.
8. Mechanical installations.
9. Cutting and patching.

1.3 CODES AND STANDARDS

A. Codes and standards referenced in the Construction Documents shall be the latest edition of the code or standard in effect as of the original release date of the Construction Documents, unless specifically indicated otherwise.

B. Codes and standards referenced in the Construction Documents shall be used as minimum construction requirements. Where the Construction Documents indicate more stringent construction requirements than a referenced code or standard, the requirements of the Construction Documents shall govern and be followed.

1.4 SUBMITTALS

A. General: Follow the procedures specified in Division 01 Section "Submittals."

1.5 COORDINATION DRAWINGS

A. General: Follow the procedures specified in Division 01 Section “Project Coordination”.

1.6 TESTS AND INSPECTIONS

A. Give 14 days' advance notice for all testing and inspections required by the individual work sections. The Owner and Engineer reserve the right to witness all tests.

B. Codes and standards referenced in the Construction Documents for tests and inspections shall be used as minimum testing and inspecting requirements. Where the Construction Documents

indicate more stringent testing and inspecting requirements than a referenced code or standard, the requirements of the Construction Documents shall govern and be followed.

C. Prepare written reports of all tests and inspections required by the individual work sections.

D. Initial Reports: Submit one (1) electronic PDF copy of each test and inspection report within seven days' of completing the test or inspection for review by the Engineer. Handwritten initial reports are acceptable.

1. Allow seven days for the Engineer's review of the initial report of each test and inspection.

E. Final Reports: Prepare typed final reports of all tests and inspections. Handwritten final reports are not acceptable. At the completion of the project, prepare a compiled report of all tests and inspections performed for each major trade; i.e., prepare a separate report for all fire protection tests and inspections; a separate report for all plumbing tests and inspections; and a separate report for all HVAC tests and inspections. Tabulate and divide the reports into separate sections organized by the individual work section that required the test or inspection. In addition to individual test and inspection reports, include the following data:

1. Title page with report date.
2. Project name.
3. Project location.
4. Architect's name and address.
5. Engineer's name and address.
6. Contractor's name and address.
7. Table of contents.

F. Submit one (1) electronic PDF copy and one (1) hard copy bound in a three-ring binder of all Final Reports as part of the closeout documents specified in Division 01 Section "Project Closeout".

1. The cover and the end of the binder shall be identified with the project name.

1.7 RECORD DRAWINGS

A. General: Follow the procedures specified in Division 01 Section "Project Closeout".

B. Prepare record drawings to indicate the following installed conditions:

1. Ductwork branches, size and locations of air distribution devices, and volume dampers.
2. Approved substitutions and Contract Modifications.

1.8 OPERATION AND MAINTENANCE MANUALS

A. General: Follow the procedures specified in Division 01 Section "Project Closeout".

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Retain shipping protective covers during storage.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. Equipment and materials, unless specified otherwise, shall be new and be the standard products of the manufacturer. Seconds, rejects, or damaged materials are not acceptable.

B. Equipment and materials shall be the standard commercial grade product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer.

C. The listing of a manufacturer for certain equipment and materials does not indicate acceptance of standard or catalogued item. All equipment and materials shall conform to the specifications and are subject to prior review and approval by the Engineer.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-in of equipment and material with field measurements and with the requirements of the actual equipment and material to be installed. Follow manufacturer's written installation instructions.

B. Refer to Divisions 2 through 16 specifications for rough-in requirements of specified equipment and material.

3.2 ACCESS

A. Generally, all concealed equipment and material requiring maintenance and/or operation are located above accessible type ceilings, or are exposed. Should any such elements be inaccessibly located in ceilings or walls, provide 24 by 24-inches square access doors (whether shown on the Drawings or not) with flush screwdriver operated lock to permit complete access. Doors shall be of the type suited to the construction into which they are to be installed and shall conform with the type and quality of doors and panels specified in Division 8.

B. Division 15 Contractors are responsible for furnishing and locating all access doors and panels for all inaccessibly concealed equipment and material. General Contractor is responsible for installation of all access doors and panels furnished by Division 15 Contractors.

3.3 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Provide and maintain temporary partitions or dust barriers adequately to prevent the spread of dust and dirt to adjacent areas.
2. Verify all dimensions by field measurements.
3. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible, while allowing for proper drainage.
4. Install systems, materials, and equipment to comply with approved submittal data, including coordination drawings. Conform to arrangements indicated by the Contract

Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, notify the Engineer of the conflict.

5. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
6. Install equipment and material to facilitate servicing, maintenance, and repair or replacement of components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
7. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
8. Provide access doors and panels for all inaccessibly concealed equipment and material behind finished surfaces.
9. Where structural steel fireproofing is removed or damaged as a result of demolition or construction activities, patch and repair the fireproofing as required to match the type and thickness of adjacent undisturbed fireproofing material.

3.4 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with the "General Conditions of the Contract for Construction" and Division 01 specifications. In addition to requirements specified in those documents, the following requirements apply:

1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
2. Minimize Noise: Core drill/saw cut concrete to avoid the use of jack hammers. Provide electrically powered welding machines in lieu of gas/diesel engines where receptacles are available.

B. Perform cutting and patching for mechanical equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Architect and/or Engineer, uncover and restore Work to provide for observation of concealed Work.

C. Cut, remove and legally dispose of selected equipment, components, and materials indicated to be demolished, and other components made obsolete by the new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

3.5 CLEANING

A. Prior to final acceptance of the project by the Owner, clean all air distribution devices of all construction dust, dirt, and debris.

END OF SECTION 15010

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Escutcheons.
5. Grout.
6. Mechanical demolition.
7. Equipment installation requirements common to equipment sections.
8. Painting and finishing.
9. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Escutcheons.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver ducts, pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. When material is storied outside, elevate above grade. When stored inside, do not exceed structural capacity of the floor.

C. Protect all equipment and material from dirt, debris, and moisture.

1.7 COORDINATION

A. Coordinate installation of mechanical systems, equipment and materials with other building components.

B. Notify the Owner of any system shutdowns two weeks prior to the shutdown, and coordinate shutdown requirements with the Owner. Obtain written approval from the Owner prior to proceeding with the shutdown.

C. Coordinate with the Owner and Engineer for all required systems testing. Notify the Owner and Engineer two weeks prior to all testing.

D. Arrange for adequate spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

E. Coordinate, sequence, and integrate installations of mechanical equipment and materials for efficient flow of the Work.

F. Coordinate installation of identifying devices after completing covering and painting where devices are applied to surfaces. Install identifying devices prior to installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Solder Filler Metals: ASTM B 32, 95-5 tin-silver, lead-free alloy (Lucas-Milhaupt Silvabrite-6 or equivalent). Include water-flushable flux according to ASTM B 813.

C. Brazing Filler Metals: AWS A5.8, BCuP-5, copper-phosphorus alloy.

D. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.3 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 150-psig minimum working pressure.

D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure.

E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure.

2.5 SLEEVES

A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

B. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening, with polished chrome-plated finish.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass.

C. One-Piece, Cast-Brass Type: With set screw.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

E. One-Piece, Stamped-Steel Type: With set screw.

F. Split-Plate, Stamped-Steel Type: With concealed hinge and set screw.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 01 Sections "Cutting and Patching" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, duct, insulation, or equipment to remain is damaged in appearance or is unserviceable as a result of demolition activities, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

D. Repair and/or patch all openings in building assemblies (walls, floors, ceilings, roofing, etc.) where mechanical components are demolished. Use similar materials as existing construction.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

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

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

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

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes. Install "dead flat" if slope is not indicated.

H. Install piping free of sags and bends.

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

J. Install piping to allow application of insulation, plus a minimum 1-inch clearance around insulation.

K. Install and support piping independently of other system components.

L. Do not allow other system components to be supported from, or come in contact with, fire-suppression system piping and components. Fire-suppression system piping and components shall be completely isolated from all other system components.

M. Install system components with pressure rating equal to or greater than system pressure rating.

N. Do not install piping above electrical equipment. If absolutely unavoidable and there is 6.5 feet or more clearance above the electrical equipment, install 3-inch deep, 20-gauge galvanized sheet metal drain pan with welded seams, corners, and discharge opening under the piping located above electrical equipment. In no circumstance shall the piping or drain pan encroach in the 6.5-foot clearance above the electrical equipment required by the National Electric Code. Drain pans must be installed and sized to prevent damage to the electrical equipment from

condensation, leaks, or breaks in the piping. Install NPS 1 copper drain piping from the drain pan and route to nearest available plumbing drain. Insulate drain piping with 0.5-inch thick ASTM C 534, Type I flexible elastomeric insulation and install with adequate slope to insure proper drainage.

O. Paint all piping, fittings, flanges, etc. exposed to view.

P. Install couplings according to manufacturer's written instructions.

Q. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping: Use the following:

   a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
   b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
   c. Insulated Piping: One-piece, stamped-steel type with spring clips.
   d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
   e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
   f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
   g. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
   h. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
   i. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

2. Existing Piping: Use the following:

   a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
   b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
   c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
   d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
   e. Bare Piping in Unfinished Service Spaces: Split-casting, cast-brass type with polished chrome-plated finish.
   f. Bare Piping in Equipment Rooms: Split-casting, cast-brass type.
   g. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.

R. Sleeves are not required for core-drilled holes.

S. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

T. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

   a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
   b. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.

      1) Seal space outside of sleeve fittings with grout.

4. Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint.

U. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Install pipe insulation continuously through fire barrier and seal pipe penetrations with firestop materials according to the appropriate UL Listed assembly detail.

V. Verify final equipment locations for roughing-in.

W. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

   1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
   2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated, while allowing for proper drainage.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.6 PAINTING

A. Paint mechanical systems, equipment, and components as specified in Division 15 Sections "Identification for HVAC Systems" and “Identification for Plumbing Systems.”

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

END OF SECTION 15050

SECTION 15063 - HANGERS AND SUPPORTS FOR PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Fastener systems.

1.3 DEFINITIONS

A. MFMA: Metal Framing Manufacturers Association.

B. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for mechanical systems shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

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

B. Schedule indicating manufacturer’s figure number, size, location and features for each required pipe hanger and support.

1.6 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. NFPA Compliance:

1. Comply with NFPA 13 for hangers and supports for fire protection systems.
2. Comply with NFPA 99 for hangers and supports for medical gas systems.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of zinc-coated carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.3 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

C. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

D. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

E. Install lateral bracing with pipe hangers and supports to prevent swaying.

F. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

1. Install building attachments to structural steel prior to application of structural steel fireproofing. Repair/patch any fireproofing disturbed by installation of building attachments. Violation of the fireproofing warranty is not acceptable.

G. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

I. Insulated Piping:

1. Attach clamps and spacers to piping.

a. For thermal-hanger shield inserts, use clamp sized to match OD of insert.
b. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 40, protective sheet metal shields at all hanger and support locations for all piping systems and all pipe sizes unless noted otherwise. Shields shall span an arc of 180 degrees. Shield dimensions shall not be less than the following:

a. NPS 2-1/2 and Smaller: 12 inches long and 0.048 inch thick.
b. NPS 3 and NPS 4: 12 inches long and 0.06 inch thick.

c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

J. Support piping independently of other system components.

3.2 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.3 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.4 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use galvanized hangers and supports for carbon-steel piping, and equipment.

D. Use galvanized hangers and supports for insulated copper piping, and equipment.

E. Use copper-coated steel hangers and supports for uninsulated copper piping and tubing.

F. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

G. Use carbon-steel pipe hangers and supports for general service applications.

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.

4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.

I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.

2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of minimum length as indicated above and as recommended in writing by manufacturer to prevent crushing insulation.

M. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 15063

SECTION 15076 - IDENTIFICATION FOR HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Duct stencils.

1.3 SUBMITTALS

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

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 DUCT STENCILS

A. Stencils: Prepared with minimum letter size of 2-1/2 inch, and showing flow direction.

1. Stencil Material: Fiberboard or metal.
2. Identification Paint: Exterior, acrylic enamel. Paint may be in pressurized spray-can form.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping, ductwork, and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 DUCT STENCIL INSTALLATION

A. Apply stenciled duct labels to indicate system designation (i.e., AHU-1, EF-1, etc.), service, and flow direction on air ducts according to the schedule noted below. Confirm all colors with the Owner prior to application.

1. Supply Ducts: Medium Green.
2. Return Ducts: Drill Press Light Brown.
3. Exhaust Ducts: Red Letter Day.

B. Locate duct stencils as follows:

1. Within 3 feet of each 90-degree elbow.
2. Within 3 feet of each branch connection.
3. Where flow pattern is not obvious, mark each duct at branch.
4. Within 3 feet of penetrations through walls, floors, ceilings, and inaccessible enclosures.
5. Within 3 feet of connection to equipment and other points of origin and termination.

3.3 ADJUSTING

A. Relocate identification materials and devices that become visually blocked by other work.

END OF SECTION 15076

SECTION 15077 - IDENTIFICATION FOR PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Ceiling grid labels.
2. Pipe labels.
3. Valve tags.

1.3 SUBMITTALS

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

B. Valve numbering scheme.

C. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 CEILING GRID LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Gray.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length varies for required label content, but not less than 2-1/2 inch. Maximum width of 3/4 inch.

F. Letter Size: 1/4 inch.

G. Fasteners: Stainless-steel self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include name or designation of equipment or device located above ceiling for the following:

1. All plumbing equipment.
2. All domestic cold water valves.
3. All domestic hot water valves.
4. All medical gas valves.
5. All natural gas valves.
6. All fuel oil valves.
7. All fire protection devices (valves, flow switches, tamper switches, etc).

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service according to ASME A13.1, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover the circumference of pipe and to attach to pipe without adhesive.

C. Pipe Label Contents: Include full name of piping service and an arrow indicating flow direction. Do not abbreviate piping service except as necessary for limited application lengths.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Size: 1-1/2 inch diameter, unless noted otherwise.
3. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. General: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
2. Frame: Extruded aluminum.

3. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.
4. Valve schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL LABEL INSTALLATION

A. Permanently fasten labels to equipment, access doors, and ceiling grids using stainless-steel self-tapping screws.

3.3 CEILING GRID LABEL INSTALLATION

A. Permanently fasten labels to ceiling grid (not tile) immediately below the equipment or device located above accessible acoustical tile ceilings.

3.4 PIPE LABEL INSTALLATION

A. Install labels with flow indication arrows showing direction of flow.

B. Pretensioned Pipe Label Installation:

1. Pipe NPS 4 and Smaller: Install full band “snap-on” type pipe labels, completely covering the circumference of pipe.
2. Pipe NPS 5 and Larger: Install full band “strap-on” type pipe labels, partially covering the circumference of pipe, and secured to the pipe with stainless steel bands.

C. Locate pipe labels as follows:

1. Within 1-1/2 feet of each valve and control device.
2. Within 3 feet of each 90-degree elbow.
3. Within 3 feet of each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
4. Within 3 feet of penetrations through walls, floors, ceilings, and inaccessible enclosures.
5. Within 3 feet of connection to equipment and other points of origin and termination.
6. At access doors, manholes, and similar access points that permit view of concealed piping.
7. Spaced at maximum intervals of 25 feet along each run. Reduce intervals to 10 feet in congested areas.

D. Pipe Label Color Schedule:

1. Domestic Cold Water Piping:

a. Background Color: Green.
b. Letter Color: White.

2. Domestic Hot Water Piping:

   a. Background Color: Yellow.
   b. Letter Color: Black.

3. Domestic Hot Water Return Piping:

   a. Background Color: Yellow.
   b. Letter Color: Black.

4. Sanitary Sewer Piping:

   a. Background Color: Green.
   b. Letter Color: White.

5. Sanitary Vent Piping:

   a. Background Color: Green.
   b. Letter Color: White.

6. Fire Protection - Sprinkler Piping:

   a. Background Color: Red.
   b. Letter Color: White.

3.5 VALVE TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Mount valve schedule on wall in accessible location in each major equipment room.

3.6 ADJUSTING

A. Relocate identification materials and devices that become visually blocked by other work.

END OF SECTION 15077

SECTION 15084 – INSULATION FOR HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulation for HVAC ductwork.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).

B. Schedule: For each HVAC service that indicates the type of insulation, thickness, density, jacket, and accessories that will be provided for each specific service.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. All Insulation: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

DELIVERY, STORAGE, AND HANDLING

B. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

C. Store insulation in a clean and dry environment. Protect insulation from dirt, debris, and moisture.

1.5 COORDINATION

A. Coordinate clearance requirements with HVAC systems Installer for insulation applications. Establish and maintain clearance requirements for installation of insulation and for space required for maintenance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Armacell, LLC.
2. The Dow Chemical Company.
3. Industrial Insulation Group, LLC (A Calsilite/Johns Manville Joint Venture).
4. Johns Manville.
5. K-Flex USA, LLC.
6. Knauf Insulation.
7. Nomaco Insulation (Noël Group, LLC).
8. Owens-Corning.
9. Pittsburgh Corning Corporation.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Insulation Schedule" article for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Glass-Fiber Blanket Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, with factory-applied FSK jacket.

1. Thermal Conductivity: 0.24 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Density: 1.5 lb/cu. ft.

2.3 INSULATING CEMENTS

A. Glass-Fiber Insulating Cement: Comply with ASTM C 195.

2.4 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Glass-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic for Indoor Use: Water based; suitable for use on below ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Width: 3 inches.
2. Thickness: 6.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Width: 2 inches.
2. Thickness: 3.7 mils.
3. Adhesion: 100 ounces force/inch in width.
4. Elongation: 5 percent.
5. Tensile Strength: 34 lbf/inch in width.

2.9 SECUREMENTS

A. Stainless Steel Bands: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 3/4 inch wide.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

2.10 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

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

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

C. Mix insulating cements with clean potable water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment.

C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item as specified in insulation system schedules.

D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Install insulation with longitudinal seams at top and bottom of horizontal runs.

F. Install multiple layers of insulation with longitudinal and end seams staggered.

G. Seal ends of insulation to match vapor barrier, factory applied jacket, and field applied jacket where installation of insulation is interrupted or stopped at the end of a run.

H. Keep insulation materials dry during storage, application, and finishing.

I. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

J. Install insulation with least number of joints practical.

K. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

L. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

M. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of ducts. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints.

N. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

O. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

P. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

Q. Items Not Insulated: Unless otherwise indicated, do not install insulation to the following:

1. Factory-insulated flexible ducts.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall, Partition, and Floor Penetrations (That Are Not Fire Rated): Install insulation continuously through walls, partitions, and floors.

3.5 INSTALLATION OF GLASS-FIBER INSULATION

1. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

2. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
3. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
4. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flanges.

B. Insulation Installation on Supply-Air Diffusers: Install insulation on the entire back (top and sides) of supply-air diffuser shells. Secure insulation to acoustical tile ceiling grids or hard ceiling framing assemblies with vapor-retarder tape around the entire perimeter of the supply-air diffuser.

3.6 DUCT INSULATION SCHEDULE, GENERAL

A. Items Not Insulated:

1. Factory-insulated flexible ducts.

3.7 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Back (Top and Sides) of Supply-Air Diffusers: Install glass-fiber blanket insulation; 2 inches thick.

B. Concealed Supply-Air and Return-Air ducts: Install glass-fiber blanket insulation; 2 inches thick.

END OF SECTION 15084

SECTION 15086 – INSULATION FOR PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulation for plumbing piping and equipment.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).

B. Schedule: For each plumbing service (i.e., piping, equipment, etc.) that indicates the type of insulation, thickness, density, jacket, and accessories that will be provided for each specific service.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. All Insulation: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

B. Store insulation in a clean and dry environment. Protect insulation from dirt, debris, and moisture.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 15 Section "Hangers and Supports for Plumbing Systems."

B. Coordinate clearance requirements with plumbing systems Installer for insulation applications. Establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes, and for space required for maintenance.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Armacell, LLC.
2. The Dow Chemical Company.
3. Industrial Insulation Group, LLC (A Calsilite/Johns Manville Joint Venture).
4. Johns Manville.
5. K-Flex USA, LLC.
6. Knauf Insulation.
7. Nomaco Insulation (Noël Group, LLC).
8. Owens-Corning.
9. Pittsburgh Corning Corporation.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Insulation Schedule" article for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

E. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Thermal Conductivity: 0.25 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

F. Glass-Fiber, Preformed Pipe Insulation: Type I glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL.

1. Thermal Conductivity: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

2.3 INSULATING CEMENTS

A. Glass-Fiber Insulating Cement: Comply with ASTM C 195.

B. Glass-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.4 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Glass-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. ASJ Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic for Indoor Use: Water based; suitable for use on below ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.6 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over insulation.
3. Service Temperature Range: 0 to plus 180 deg F.
4. Color: White.

2.7 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.8 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Width: 2 inches.
2. Thickness: 6 mils.
3. Adhesion: 64 ounces force/inch in width.
4. Elongation: 500 percent.
5. Tensile Strength: 18 lbf/inch in width.

2.10 SECUREMENTS

A. Stainless Steel Bands: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 3/4 inch wide.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

2.11 PROTECTIVE SHIELDING PIPE GUARDS

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

1. McGuire Manufacturing Company, Inc.
2. Plumberex Specialty Products, Inc.
3. The Keeney Manufacturing Company
4. Truebro, Inc. (IPS Corporation)
5. Zurn Plumbing Products

B. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

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

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment.

C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item as specified in insulation system schedules.

D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Install insulation with longitudinal seams at top and bottom of horizontal runs.

F. Install multiple layers of insulation with longitudinal and end seams staggered.

G. Seal ends of insulation to match vapor barrier, factory applied jacket, and field applied jacket where installation of insulation is interrupted or stopped at the end of a run.

H. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

I. Keep insulation materials dry during storage, application, and finishing.

J. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

K. Install insulation with least number of joints practical.

L. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

M. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

N. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints.

O. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

P. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

Q. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

R. Items Not Insulated: Unless otherwise indicated, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.
5. Piping system unions.
6. Piping system flow regulators.

S. Do not proceed with installation of piping insulation until after piping has been successfully pressure tested, found to be in compliance with the testing requirements specified in the Division 15 piping sections, and the initial piping pressure test reports have been submitted to the Engineer.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall, Partition, and Floor Penetrations (That Are Not Fire Rated): Install insulation continuously through walls, partitions, and floors.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Comply with requirements of UL penetration details for firestopping and fire-resistive joint sealers.

C. Insulation Installation at Fire-Rated Floor Penetrations: Install insulation continuously through penetrations of fire-rated floors. Comply with requirements of UL penetration details for firestopping and fire-resistive joint sealers.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 INSTALLATION OF GLASS-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with glass-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Where specified, paint jacket with paint system identified in Division 15 Section "Identification for Plumbing Systems."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

   a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Items Not Insulated:

1. Underground piping.
2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

B. Field-Applied Jackets:

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water Piping:

1. NPS 1 and Smaller: Install glass-fiber, preformed pipe insulation; 1 inch thick.
2. NPS 1-1/4 to NPS 2: Install glass-fiber, preformed pipe insulation; 1-1/2 inches thick.

B. Domestic Hot Water Piping:

1. NPS 1 and Smaller: Install glass-fiber, preformed pipe insulation; 1 inch thick.
2. NPS 1-1/4 to NPS 2: Install glass-fiber, preformed pipe insulation; 1-1/2 inches thick.

C. Domestic Recirculated Hot Water Piping:

1. NPS 1 and Smaller: Install glass-fiber, preformed pipe insulation; 1 inch thick.
2. NPS 1-1/4 to NPS 2: Install glass-fiber, preformed pipe insulation; 1-1/2 inches thick.

D. Exposed Sanitary Traps and Drain Piping, and Domestic Hot and Cold Water Supplies and Stops for Plumbing Fixtures:

1. All Pipe Sizes: Install protective shielding pipe guards.

END OF SECTION 15086

SECTION 15113– GENERAL DUTY VALVES FOR PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze lift check valves.
3. Brass swing check valves.

B. Related Sections:

1. Division 15 Section "Identification for Plumbing Systems" for valve tags and schedules.
2. Division 15 Section “Insulation for Plumbing Systems” for insulation thickness of piping systems to select length of valve stem extensions.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry.

D. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

1.4 SUBMITTALS

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

1. Certification that products comply with NSF 61.

B. Valve Schedule: For indicating which valves will be provided for each piping system. Include pressure class of valve.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and weld ends.
3. Set ball valves open to minimize exposure of functional surfaces.
4. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handlevers or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

C. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream piping unless otherwise indicated.

E. Valve Actuator Types:

1. Handlever: For quarter-turn valves NPS 2 and smaller.

F. Valves in Insulated Piping: With stem extensions of sufficient length to accommodate insulation thickness and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

G. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
   a. Caution: Where soldered joint connections are used, use solder having a melting point below 430 deg F.
3. Threaded: With threads according to ASME B1.20.1.

H. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRASS BALL VALVES

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

1. Apollo (Conbraco Industries).
2. Jamesbury (Metso Automation).
3. KF Industries (CIRCOR Energy Products).
4. Milwaukee Valve Co.
5. Nibco, Inc.
6. Stockham (Crane Valve Group).
7. Watts Water Technologies, Inc.

B. Two-Piece, Full-Port, Brass Ball Valves:

1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Forged brass.
e. Ends: Threaded or solder joint.
f. Seats: PTFE.
g. Stem: Brass.
h. Ball: Chrome-plated brass.
i. Port: Full.
j. Handlever: Vinyl-covered steel with memory stop.
k. Example: Stockham Figure No. T-255 or S-255

2.3 BRONZE LIFT CHECK VALVES

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

1. Milwaukee Valve Co.
2. Nibco, Inc.
3. Powell Valves (Wm Powell Co.).
4. Stockham (Crane Valve Group).

B. Class 125, Lift Check Valves:

1. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Design: Vertical flow.
d. Body Material: ASTM B 61 or ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.
g. Example: Stockham Figure No. B-316.

2.4 BRASS SWING CHECK VALVES

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

1. Milwaukee Valve Co.
2. Nibco, Inc.
3. Powell Valves (Wm Powell Co.).
4. Stockham (Crane Valve Group).

B. Class 125, Brass Swing Check Valves:

1. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: Brass.
e. Ends: Threaded.
f. Disc: Brass.
g. Example: Stockham Figure No. LFB-319Y.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level. Do not install in vertical position.
2. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball valves.

B. If valves with specified CWP ratings are not available, the same types of valves with higher CWP ratings may be substituted.

C. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends; however, solder joint ends may be used for ball valves.

D. For valves installed in insulated piping, provide stem extensions of sufficient length to accommodate insulation thickness.

3.5 DOMESTIC HOT AND COLD WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Brass Ball Valves: Two piece, full port.
2. Bronze Lift Check Valves: Class 125.
3. Brass Swing Check Valves: Class 125.

END OF SECTION 15113

SECTION 15140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes pipe and fitting materials, joining methods, valves, and specialties for domestic water piping systems.

1.3 PERFORMANCE REQUIREMENTS

A. Piping, components and accessories, and installation shall be capable of withstanding the following minimum design pressure and temperature:

1. Domestic water piping: 150 psig at 200 deg F.

1.4 SUBMITTALS

A. Product Data: For each type of the following:

1. Pipe and fittings.
2. Valves: Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves.
3. Domestic water specialties.

B. System purging and disinfecting activities report.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Potable-water piping and components shall comply with NSF 61.

B. Soldering: Qualify procedures and operators according to CDA-S001 “Soldering Procedure Specification, Procedure Qualifications Records, and Solder Performance Qualification Records.”

1. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
2. Certify that each solderer has passed CDA qualification tests for soldering processes involved and that certification is current.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

B. Wrought-Copper Fittings and Unions: ASME B16.22.

2.2 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, 95-5 tin-silver, lead-free alloy (Lucas-Milhaupt Silvabrite-6 or equivalent). Include water-flushable flux according to ASTM B 813.

2.3 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

D. Plastic-to-Metal Transition Fittings:

1. Description:

a. CPVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
b. One end with threaded brass insert and one solvent-cement-socket end.

E. Plastic-to-Metal Transition Unions:

1. Description:

a. CPVC four-part union.
b. Brass threaded end.
c. Solvent-cement-joint plastic end.
d. Rubber O-ring.
e. Union nut.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Standard: ASSE 1079.
2. Pressure Rating: 250 psig.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Nipples:

1. Standard: IAPMO PS 66.
2. Electroplated steel nipple complying with ASTM F 1545.
3. Pressure Rating and Temperature: 300 psig.
4. End Connections: Male threaded or grooved.
5. Lining: Inert and noncorrosive, propylene.

2.5 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

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

   a. Jay R Smith Manufacturing Co.
   b. Josam Company.
   c. MIFAB Manufacturing, Inc.
   d. Watts Water Technologies, Inc.
   e. Zurn Plumbing Products.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows or copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

PART 3 - EXECUTION

3.1 ABOVEGROUND DOMESTIC WATER PIPING APPLICATIONS

A. NPS 4 and Smaller: Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

3.2 PIPING INSTALLATION

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

B. Install shutoff valve immediately upstream of each dielectric fitting.

C. Install domestic water piping level and plumb.

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

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

F. Install piping to permit valve servicing.

G. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

H. Install piping free of sags and bends.

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

J. Avoid creating dead-legs where there is no flow in the piping system. Where unavoidable, the length of the branch pipe dead-leg shall not exceed 3 diameters of the branch pipe measured from the sidewall of the main pipe.

K. Install steel pipe sleeves for piping penetrations of concrete walls and slabs.

L. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

1. The insertion distance of piping/tubing into each fitting shall not be less than 95 percent, or greater than 100 percent, of the full insertion distance of the fitting.
2. The solder filler material shall have a minimum penetration depth of 100 percent of the fitting’s full insertion distance everywhere around the entire circumference of the fitting.
3. Beaded solder filler material shall fully encompass the exterior circumference of the soldered fitting such that no portion of the fitting bottom lip is exposed.
4. Piping/tubing ends shall be fully deburred around the entire interior circumference of the piping/tubing ends. The deburring process shall effectively use tubing blocks to prevent chips from entering the system. The tubing blocks shall not contaminate the piping/tubing.

5. The interior of the fitting shall be free of any debris, grease, oil, dirt, oxidation scale, pipe/tube material chips or foreign material.

E. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings, nipples or unions.

3.6 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

3.7 DOMESTIC WATER SPECIALTIES INSTALLATION

A. Install water-hammer arresters in water piping according to PDI-WH 201.

3.8 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 15 Section "Hangers and Supports for Plumbing Systems" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Install the following pipe supports:

1. Adjustable steel clevis hangers for individual horizontal cold piping; all pipe sizes.
2. Adjustable steel clevis hangers for individual horizontal hot piping; NPS 2 and smaller.
3. Provide copper-coated steel hangers and supports for hangers and supports in direct contact with uninsulated copper pipe.
4. Provide nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

C. Support piping independently of other system components.

D. Support vertical piping and tubing at base and at each floor.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: Maximum span, 5 feet; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 6 feet; minimum rod size, 3/8 inch.
3. NPS 1-1/2 to NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
4. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 1/2 inch.
5. NPS 3 to NPS 4: Maximum span, 10 feet; minimum rod size, 5/8 inch.
6. NPS 6 to NPS 8 Maximum span, 10 feet; minimum rod size, 3/4 inch.

F. Install supports for vertical copper tubing at each floor, and at 10-foot intervals between floors.

G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.9 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect domestic water piping to existing domestic water piping. Use transition fitting to join dissimilar piping materials.

C. Connect domestic water piping to existing domestic water piping with shutoff valve; extend and connect to the following:

1. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.

D. Install and support piping to minimize equipment nozzle loads to a level acceptable to the equipment manufacturer.

3.10 IDENTIFICATION

A. Identify piping and system components. Comply with requirements for identification materials and installation in Division 15 Section "Identification for Plumbing Systems."

3.11 FIELD QUALITY CONTROL

A. Give 14 days' advance notice for all testing. The Owner and Engineer reserve the right to witness tests.

B. Installation Requirements: For any requirements in this specification that exceed the requirements of industry accepted practices or regulatory minimum conditions, the requirements of this specification shall govern and control. Any materials or workmanship that are found to be deficient of specific codes or standards, or the requirements of this specification, shall be repaired or replaced at the Contractor’s expense.

C. Prepare domestic water piping according to ASME B31.9 and as follows:

1. Leave joints uninsulated and exposed for examination during leak test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.

3. Flush domestic water piping systems with clean water at velocities specified below until drained water is clear; then remove and clean or replace strainer screens.

    a. Piping NPS 3 and Smaller: Minimum velocity of 5 fps.
    b. Piping NPS 4 and Larger: Minimum velocity of 8 fps.
    c. Isolate and flush piping of dissimilar materials independently of each other.
    d. Provide temporary pump(s), piping, auxiliary components, and electrical service, if/as necessary, to achieve the minimum flushing velocities.
    e. Prepare written report of each piping system flush.

4. Isolate equipment from piping during flushing and leak testing. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install a temporary safety valve during the leak test, set at a pressure no more than 50 psig higher than the test pressure to prevent damage to the piping system and its components.

D. Perform the following tests on domestic water piping:

1. Use water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that domestic water system is full of water.
4. Pressurize piping system to a hydrostatic pressure of 125 psig for 3 hours to allow the temperature of the water to stabilize.
5. After 3 hours, subject piping system to hydrostatic test pressure of 150 psig for one hour. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

    a. After pressurizing the system to 150 psig, record the test pressure prior to starting test.
    b. After one hour, re-record test pressure and examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

6. Prepare written report of each piping system test.
7. Do not proceed with installation of piping insulation until after piping has been successfully pressure tested, found to be in compliance with the testing requirements specified herein, and the initial piping pressure test reports have been submitted to the Engineer.

E. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect and set operating temperatures of domestic water equipment to specified values.

3.12 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.

4. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
7. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.13 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to either of the following:

      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Repeat procedures if biological examination shows contamination.
   e. Submit water samples in sterile bottles to authorities having jurisdiction.

END OF SECTION 15140

SECTION 15150 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Specialty pipe fittings.
3. Cleanouts.
4. Miscellaneous sanitary drainage piping specialties.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Sanitary Waste and Vent Piping: 10-foot head of water.

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Sanitary drainage equipment and specialties shall bear label, stamp, or other markings of specified testing agency.

C. Cast iron soil pipe and fittings shall bear label, stamp, or other markings of the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and shall be listed by NSF International.

PART 2 - PRODUCTS

2.1 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Heavy-Duty, Hubless-Piping Couplings:

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

a. Anaco No-Hub Couplings, "Husky HD-2000” series.

b. Ideal Clamp Products, Inc., “Ideal Tridon Heavy-Duty” series.
c. Mission Rubber Company, “HeavyWeight” series.

2. Standards: ASTM C 1277, ASTM C 1540, and FM-1680.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
4. Tensile Strength: 1500 psig.
5. Shield: Type 304 corrugated stainless-steel, 0.010-inch thick.

a. NPS 4 and Smaller: 3-inches wide.
b. NPS 5 to NPS 10: 4-inches wide.

6. Clamps: Type 304 stainless-steel.

a. NPS 4 and Smaller: 4 clamps mounted in a series.
b. NPS 5 to NPS 10: 6 clamps mounted in a series.

7. Screws: Type 305 stainless-steel, 5/16-inch hex head.
8. Gasket: ASTM C 564 neoprene.

2.2 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:

a. Standard: ASTM C 1173.
b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
c. Sleeve Materials:

1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.3 CLEANOUTS

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

1. Jay R Smith Manufacturing Co.
2. Josam Company.
3. MIFAB Manufacturing, Inc.
4. Watts Water Technologies, Inc.
5. Zurn Plumbing Products.

B. Cast-Iron Floor Cleanouts:

1. Standard: ASME A112.36.2M.
2. Size: Same as connected drainage piping.
3. Type: Adjustable housing.
4. Body or Ferrule: Cast iron.
5. Clamping Device: Required.
6. Outlet Connection: Inside calk.
7. Closure: Raised head brass plug with tapered threads.
8. Adjustable Housing Material: Cast iron.
9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Heavy Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
13. Floor Access: Round, stainless-steel cover plate with screw.

C. Cast-Iron Wall Cleanouts:

1. Standard: ASME A112.36.2M.
2. Size: Same as connected drainage piping.
3. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
4. Closure: Raised head brass plug with tapered threads.
5. Wall Access: Round, flat, stainless-steel cover plate with screw.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Deep-Seal Traps:

1. Description: Material, inlet, and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.

   a. NPS 2: 4-inch minimum water seal.
   b. NPS 2-1/2 and Larger: 5-inch minimum water seal.

PART 3 - EXECUTION

3.1 ABOVEGROUND SOIL AND WASTE PIPING APPLICATIONS

A. All Sizes: Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

3.2 ABOVEGROUND VENT PIPING APPLICATIONS

A. All Sizes: Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are discussed and approved by Engineer.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

D. Install piping at indicated slopes.

E. Install piping free of sags and bends.

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

G. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

1. Do not install back-to-back drainage elbows.

H. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain:

a. NPS 3 and Smaller: 1/4-inch per foot (2 percent) downward in direction of flow.
b. NPS 4 and Larger: 1/8-inch per foot (1 percent) downward in direction of flow.

2. Vent Piping: 1/8-inch per foot (1 percent) down toward vertical fixture vent or toward vent stack.

I. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

J. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

K. Install steel pipe sleeves for piping penetrations of concrete walls and slabs.

L. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.4 BUILDING DRAIN SPECIALTIES INSTALLATION

A. Install cleanouts in building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.

3. Locate at minimum intervals of 100 feet.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install deep-seal traps on floor drains and other waste outlets.

3.5 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

1. Tighten hubless-piping couplings to 80 inch-pounds of torque.

3.6 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Unshielded, nonpressure transition couplings.

3.7 HANGERS AND SUPPORTS

A. Comply with requirements in Division 15 Section "Hangers and Supports for Plumbing Systems" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Install the following pipe supports:

1. Horizontal Piping: MSS Type 1, adjustable steel clevis hangers.
2. Vertical Piping: MSS Type 8 or Type 42, clamps.

C. Support piping independently of other system components.

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

E. Support vertical piping at base and at each floor.

F. Install hangers for cast-iron piping with the following maximum horizontal spacing and minimum rod diameters:

1.	NPS 1-1/2 and NPS 2:	Maximum span, 5 feet; minimum rod size, 3/8 inch.
2.	NPS 3:	Maximum span, 5 feet; minimum rod size, 1/2 inch.
3.	NPS 4:	Maximum span, 5 feet; minimum rod size, 5/8 inch.
4.	NPS 6:	Maximum span, 5 feet; minimum rod size, 3/4 inch.
5.	NPS 8 to NPS 12:	Maximum span, 5 feet; minimum rod size, 7/8 inch.
6.	NPS 15:	Maximum span, 5 feet; minimum rod size, 1 inch.

G. Install supports for vertical cast-iron piping at base; at each floor; and every 10 feet between floors.

H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to existing sanitary sewer piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3.9 IDENTIFICATION

A. Identify piping and system components. Comply with requirements for identification materials and installation in Division 15 Section "Identification for Plumbing Systems."

3.10 FIELD QUALITY CONTROL

A. Give 14 days' advance notice for all testing. The Owner and Engineer reserve the right to witness tests.

B. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

C. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

D. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

E. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction and as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced sanitary waste and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test sanitary waste and vent piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
4. After hydrostatic test has been applied for at least 4 hours, examine water level, and piping, joints, and connections for leakage. Water level must not drop. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
5. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
6. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
7. Prepare reports for tests and required corrective action.

3.11 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 15150

SECTION 15213 - MEDICAL GAS 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 medical gas piping and related specialties for the following medical gas systems:

1. Medical gas pressure systems:

   a. Oxygen piping, designated "oxygen."
   b. Medical compressed-air piping, designated "medical air."

2. Medical gas suction systems:

   a. Medical-surgical vacuum piping, designated "medical vacuum."

1.3 DEFINITIONS

A. ASSE: American Society of Sanitary Engineering.

B. CR: Chlorosulfonated polyethylene synthetic rubber.

C. D.I.S.S.: Diameter-index safety system.

D. PTFE: Polytetrafluoroethylene plastic.

E. PVC: Polyvinyl chloride plastic.

F. TFE: Tetrafluoroethylene plastic.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide medical gas and vacuum piping systems that comply with the following NFPA 99 category:

1. Category 1: For the entire facility where failure of equipment or systems is likely to cause major injury or death of patients or caregivers. Equipment and systems are expected to work or be available at all times to support patient needs.

1.5 SUBMITTALS

A. Installation and/or brazing certification signed by Contractor certifying that all persons installing medical gas systems comply with the requirements specified in NFPA-99, “Health Care Facilities” and ASSE Standard 6010. The documentation shall consist of the following:

1. Certificate of Brazing issued to participant.
2. Brazing Procedure Specification (BPS) – the document that specifies the required brazing variables for a specific application.
3. Procedure Qualification Record (PQR) – a record of brazing variables and conditions used to produce an acceptable test brazement procedure specification.
4. Brazing Performance Qualification Record (BPQR or BQR) – a record of the brazing conditions used to produce an acceptable test brazement and the results of the tests conducted on the brazement to qualify a brazer.
5. Certificate of proof that proposed brazer has taken and successfully passed the 32-hour class required by ASSE Standard 6010.

All documentation listed above shall be submitted for approval for each person engaged in installing/brazing medical gas piping for this project.

B. Product Data: For the following:

1. Medical gas tubes and fittings.

C. Brazing Certificates: As required by ASME Boiler and Pressure Vessel Code, Section IX, or AWS B2.2.

D. Piping Material Certification: Signed by Installer certifying that medical gas piping materials comply with NFPA 99 requirements.

E. Field quality-control test reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: All persons installing medical gas systems shall acquire and maintain certification according to the requirements of ASSE Standard 6010, Professional Qualification Standards for Medical Gas Systems Installers.

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

C. Comply with NFPA 99, "Health Care Facilities."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store large medical gas components on factory-installed shipping skids, tubing with sealing plugs in ends or with end protection, and small accessories in factory-fabricated fiberboard containers.

1. Store precleaned and sealed medical gas tube, fittings, valves, and accessories with sealing plugs and sealing packaging intact.

2. Label medical gas tube, fittings, valves, and accessories that have not been precleaned, and that have been precleaned but have seals or packaging that is not intact, with temporary labels indicating that cleaning is required before installation.
3. Inspection of labeling, quantities and quality of each item stored shall be made by the Designer and be a basis of approval of the first and subsequent progress payments.
4. Medical gas piping, materials, and components are not allowed to be stored on the floor. Any piping, materials, and components stored in this manner shall be removed from the job-site.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Hard Copper Tube: ASTM B 819, Type K or L, seamless, drawn-temper, medical gas tube that has been factory cleaned, purged, and sealed for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in green for Type K tube and blue for Type L tube.

1. Fittings: Factory cleaned, purged, and bagged for oxygen service according to ASTM B 819 or field cleaned, purged, and bagged as specified in "Preparation" Article in Part 3.

a. Copper Pressure Fittings: ASME B16.22, wrought-copper solder-joint pressure type or MSS SP-73, wrought copper with dimensions for brazed joints.
b. Cast-Copper-Alloy Flanges: ASME B16.24, Class 300.
c. Copper Unions: ASME B16.22 or MSS SP-123.

2.2 JOINING MATERIALS

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joining materials not in this Section.

B. Brazing Filler Metals: AWS A5.8, BCuP-5, copper-phosphorus alloy. Flux is prohibited unless used with bronze fittings.

C. Threaded-Joint Tape: PTFE.

D. Gasket Material: ASME B16.21, nonmetallic, flat, asbestos free, and suitable for oxygen service.

2.3 MEDICAL GAS SERVICE CONNECTIONS

A. Manufacturer: Subject to compliance with requirements, provide products by BeaconMedaes to match the same model and style currently in use in the hospital.

2.4 TEST GAS

A. Description: Oil-free dry nitrogen NF complying with CGA P-9, for purging and testing of piping.

PART 3 - EXECUTION

3.1 PREPARATION

A. Interruption of Existing Medical Gas Service: Do not interrupt medical gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary medical gas service according to requirements indicated:

1. Notify Architect and Owner not less than two weeks in advance of proposed interruption of medical gas service.
2. Do not proceed with interruption of medical gas service without Architect's and Owner's written permission.

B. Cleaning of Piping: If factory-cleaned and -capped medical gas piping is not available or if precleaned piping must be recleaned because of exposure, perform the following procedures:

1. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1, "Cleaning Equipment for Oxygen Service."
2. Wash medical gas piping and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.
   a. Scrub to ensure complete cleaning.
   b. Rinse with clean, hot water to remove cleaning solution.

3.2 PIPING APPLICATIONS

A. General: Use pipe, tube, fittings, and joining methods for medical gas piping systems according to the following applications.

B. Joining of Dissimilar Metal Piping: Use dielectric fittings. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fitting types.

1. NPS 2 and Smaller: Use dielectric unions.

C. Specialty and Equipment Flanged Connections: Use cast-copper-alloy companion flange with gasket and brazed joint for connection to copper tube.

D. Medical Gas Piping Operating Less Than 180 psig: Use ASTM B 819, Type L, hard copper tube, copper pressure fittings, and brazed joints.

E. Medical Vacuum Piping: Use ASTM B 819, Type L, hard copper tube, copper pressure fittings, and brazed joints.

3.3 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Purge medical gas piping, using oil-free dry nitrogen NF during all brazing activities.

C. Protect all medical gas piping from physical contact with other metal building components such as other piping systems, wall framing studs, structural steel, etc.

3.4 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Brazed Joints: Use copper-phosphorus-composition filler metal and comply with CDA's 2010 edition of the "Copper Tube Handbook," Section VII, "Brazed Joints"; and AWS D10.13, 2001 edition of the "Recommended Practices for the Brazing of Copper Pipe and Tubing for Medical Gas Systems."

1. The insertion distance of piping/tubing into each fitting shall not be less than 95 percent, or greater than 100 percent, of the full insertion distance of the fitting.
2. The brazing filler material shall have a minimum penetration depth of 50 percent of the fitting's full insertion distance everywhere around the entire circumference of the fitting.
3. Beaded brazing filler material shall fully encompass the exterior circumference of the soldered fitting such that no portion of the fitting bottom lip is exposed.
4. Piping/tubing ends shall be fully deburred around the entire interior circumference of the piping/tubing ends, and shall be performed by a cutting type, reamer process only.
5. The interior of the fitting/tubing area shall be free of any debris, grease, oil, dirt, tubing or fitting discoloration, oxidation, scale, pipe/tube material chips, or foreign material.

3.5 FIELD QUALITY CONTROL

A. Give 14 days' advance notice for all testing. The Owner and Engineer reserve the right to witness tests.

B. Installation Requirements: For any requirements in this specification that exceed the requirements of industry accepted practices or regulatory minimum conditions, the requirements of this specification shall govern and control. If these requirements conflict with any code or standard that is referenced, or invoked by a reference for this project or by an authority having jurisdiction, the Owner shall be contacted to render a resolution which is final and binding for the installing Contractor. Any materials or workmanship that are found to be deficient of specific codes or standards, or the requirements of this document, shall be repaired or replaced at the Contractor's expense.

C. Brazer Qualifications and Installation/Brazing Requirements: Contractor shall submit to the Owner and Engineer qualification certificates for each proposed brazer as specified in paragraph 1.5.A <u>prior</u> to commencement of any medical gas work. Any brazer that does not have their qualifications and certificates in the submittal shall not be allowed to perform brazing activities until their qualifications and certificates are reviewed and accepted by the Owner and Engineer.

1. The brazer and brazing installation shall comply with the requirements of NFPA 99.
2. The following installation and brazing procedures shall be implemented and adhered to:
   a. The brazing process shall include using an oil-free dry nitrogen NF purge to remove oxygen and moisture prior to, during, and following the brazing activity until the brazed area has cooled to the touch.
   b. Prior to commencing with brazing, an oxygen sensor shall be affixed to the piping to be brazed and shall remain in place throughout the entire brazing activity. The oxygen sensor shall have an audible alarm to ensure appropriate oxygen content is achieved and that the nitrogen purge in use and is sufficient prior to, during, and following the entire brazing activity.
   c. The plug end (or capped end) of the piping/tubing shall be cut off and never used in the system installation.

d. Deburring of the piping/tubing shall be effective around the entire circumference of the piping/tubing, and shall be performed by a deburring tool.
e. The deburring process, if required, shall effectively use tubing blocks to prevent chips from entering the system. The tubing blocks shall not contaminate the piping/tubing.
f. All debris, grease, oil, dirt, pipe/tube material chips, and foreign material shall be prevented from entering the medical gas system piping/tubing

D. Installer-Performed Testing: The installing contractor shall perform, document, and issue a final report to the Owner, Engineer, and the independent testing agency for all NFPA 99 required installer-performed tests prior to starting any system verification testing. The Owner and Engineer reserve the right to witness these tests and shall be notified 14-days in advance of the start of installer-performed testing. Installer-performed testing cannot be performed by the independent testing agency. Include the following:

1. Initial Piping Blow Down: Clear distribution piping after installation by means of oil-free dry nitrogen NF before installation of station outlet/inlet rough-in assemblies and other system components.
2. Initial Pressure Tests: Subject each piping section to test pressure of 1.5 times system working pressure, but not less than 150 psig, after blow down of the distribution piping, after installation of station outlet/inlet rough-in assemblies, before attaching system components that would be damaged by the test pressure, and before concealing the piping system. Maintain test until all joints are examined for leaks by means of a leak detectant that is safe for use with oxygen and does not contain ammonia. Repair leaks with new materials and retest systems.
3. Initial Cross-Connection Tests: Determine that no cross connections of piping systems exist. Disconnect all systems except system to be checked. Individually pressurize each system to 50 psig by means of oil free nitrogen NF. Verify that gas flow from each station outlet/inlet is only from the system being checked. Repeat for each system. Verify correct labeling.
4. Initial Piping Purge Tests: Perform intermittent high-volume flow purging of piping, system components, and station outlets/inlets until purge produces no discoloration in a white clean cloth.
5. Standing-Pressure Tests for Positive Pressure Piping: After successful completion of the initial pressure tests and final installation of system components and station outlets, subject systems to a 24-hour standing-pressure test at 20 percent above normal line pressure. Verify that pressure differences comply with required calibration. Repair leaks with new materials and retest systems.
6. Standing-Vacuum Test for Vacuum Piping: After successful completion of the initial pressure tests and final installation of system components and station inlets, subject vacuum distribution piping to a 24-hour standing-vacuum test between 12-in. Hg and full vacuum. During the test, the source of test vacuum shall be disconnected from the vacuum system. At the conclusion of the test, there shall be no change in the vacuum pressure other than that attributed to changes of ambient temperature. Repair leaks with new materials and retest systems.

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

1. Inspections performed.
2. Procedures, materials, and gases used.
3. Test methods used.
4. Results of tests.

END OF SECTION 15213

SECTION 15330 - WET-PIPE FIRE-SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Sprinklers.

1.3 DEFINITIONS

A. Standard-Pressure Sprinkler and/or Standpipe Piping: System piping designed to operate at working pressure of 175 psig maximum.

B. NICET: National Institute for Certification in Engineering Technologies.

1.4 SYSTEM DESCRIPTIONS

A. Combined Standpipe and Sprinkler System: Fire-suppression system with both standpipe and sprinkler systems. Sprinkler system is supplied from standpipe system.

B. Automatic Wet-Type, Class I Standpipe System: Includes NPS 2-1/2 hose connections. Has open water-supply valve with pressure maintained and is capable of supplying water demand.

C. Manual Wet-Type, Class I Standpipe System: Includes NPS 2-1/2 hose connections. Has small water supply to maintain water in standpipes. Piping is wet, but water must be pumped into standpipes to satisfy demand.

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

1.5 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Delegated Design: Design fire-suppression system(s), including comprehensive engineering analysis using performance requirements and design criteria specified herein and indicated on the Drawings.

1. Design shall be performed under the responsible charge of:

a. A qualified designer with a NICET Level III or higher certification; or
b. A qualified professional engineer licensed in the State of North Carolina.

2. Design shall include, but not be limited to:

   a. Layout and sizing of all piping.
   b. Layout of all sprinkler heads.
   c. Determination of sprinkler heads temperature classifications for the required application and location in which they are installed.
   d. Determination of automatic air vent locations.
   e. Hydraulic calculations.
   f. Coordination of fire-suppression work with other trades' system components.

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

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications: As indicated on the Drawings.
3. Minimum Design Density:

   a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
   b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.

4. Maximum Protection Area per Sprinkler: Per UL listing, but not more than:

   a. Light-Hazard Occupancy: 225 sq. ft.
   b. Ordinary-Hazard Occupancy: 130 sq. ft.

5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

   a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
   b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.

6. Minimum residual pressure at each hose-connection outlet is as follows:

   a. NPS 2-1/2 Hose Connections: 100 psig.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For fire-suppression system(s). Include plans, elevations, sections, details, and attachments to other work.

1. Approved Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations. Each drawing and the calculations shall include the following:

   a. Fire-suppression contractor's company name, address, and phone number.
   b. Fire-suppression contractor's North Carolina fire-sprinkler license number.
   c. Name of the qualified designer responsible for the design of the fire-suppression system(s) and their NICET level; or
   d. Name of the qualified professional engineer responsible for the design of the fire-suppression system(s) and their North Carolina PE license number.
   e. Signed seal of the qualified NICET designer or qualified professional engineer.

C. Qualification Data: For qualified Installer, NICET designer, and professional engineer.

D. Welding certificates.

E. Fire-hydrant flow test report.

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

G. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing qualified engineering services needed to assume engineering responsibility.

1. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified NICET designer or professional engineer.

B. Grooved Mechanical Joints: Installers shall be certified by grooved mechanical joint manufacturer as having been trained and qualified to join piping with grooved mechanical couplings and fittings.

1. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
2. Certify that each installer has certification for installing grooved mechanical joints and that certification is current.

C. NFPA Standards: Fire-suppression system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, "Installation of Sprinkler Systems."
2. NFPA 14, "Installation of Standpipe and Hose Systems."

1.8 COORDINATION

A. Coordinate layout and installation of fire-suppression piping with other construction located above ceilings.

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

PART 2 - PRODUCTS

2.1 STEEL PIPE AND FITTINGS

A. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M. Pipe ends may be factory or field formed to match joining method.

B. Schedule 40, Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

C. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, Schedule 40, seamless steel pipe with threaded ends.

D. Steel Couplings: ASTM A 865, threaded.

E. Cast-Iron Threaded Fittings:

1. Standard-Pressure Piping: ASME B16.4, Class 125.

F. Malleable-Iron Threaded Fittings:

1. Standard-Pressure Piping: ASME B16.3, Class 150.

G. Malleable- or Ductile-Iron Unions: UL 860.

H. Cast-Iron Flanges: ASME 16.1, Class 125.

I. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

J. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

K. Grooved-Joint, Steel-Pipe Appurtenances:

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

a. Anvil International, Inc.
b. Central Grooved Piping Products.
c. Grinnell Mechanical Products.
d. Victaulic Company of America.

2. Pressure Rating:

a. Standard-Pressure Piping: 175 psig minimum.

3. Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.2 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic and asbestos free.

1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
2. Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.3 SPRINKLER SPECIALTY PIPE FITTINGS

A. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating:

   a. Standard-Pressure Piping: 175 psig minimum.

3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-T and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

2.4 SPRINKLERS

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

1. AFAC, Inc.
2. Central Sprinkler Corporation.
3. Globe Fire Sprinkler Corporation.
4. Grinnell Fire Protection.
5. Reliable Automatic Sprinkler Co., Inc.
6. Tyco Fire & Building Products.
7. Victaulic Company.
8. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Standard-Pressure Automatic Sprinklers: 175 psig.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: UL 199.
2. Characteristics: Quick response, nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Types:

1. Concealed sprinklers.

E. Sprinkler Finishes: Chrome plated, bronze, and painted.

F. Sprinkler Escutcheons: Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 EXAMINATION

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

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

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

3.3 PIPING APPLICATIONS

A. Standard-Pressure, Wet-Pipe Fire-Suppression Piping:

1. NPS 2 and Smaller: Schedule 40, black-steel pipe with threaded ends; Class 125 cast-iron or Class 150 malleable-iron threaded fittings; and threaded joints.
2. NPS 2-1/2 and Larger: Schedule 10, black-steel pipe with roll-grooved ends; grooved-end fittings and couplings rated for 175 psig; and grooved joints.

3.4 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Engineer before deviating from approved working plans.

B. Piping Standard:

1. Comply with requirements for installation of sprinkler piping in NFPA 13.
2. Comply with requirements for installation of standpipe piping in NFPA 14.

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

D. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

E. Fill fire-suppression system piping with water.

F. Install steel pipe sleeves for piping penetrations of concrete walls and slabs.

G. Install escutcheons for piping penetrations of walls, ceilings, and floors.

H. Install and support piping independently of other system components.

I. Do not allow other system components to be supported from, or come in contact with, fire-suppression system piping and components. Fire-suppression system piping and components shall be completely isolated from all other system components.

3.5 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

D. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

F. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

3.6 CONNECTIONS

A. Connect fire-suppression piping to building's existing fire-suppression piping.

B. Install and support piping to minimize equipment nozzle loads to a level acceptable to the equipment manufacturer.

3.7 SPRINKLER APPLICATIONS

A. Drawings indicate sprinkler types to be used. Where specific types are not indicated, use the following sprinkler types:

1. Rooms with Suspended Ceilings: concealed sprinklers as indicated.

B. Sprinkler Finishes:

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.

3.8 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling tiles.

B. Install sprinklers in gypsum board ceilings coordinated and aligned with other ceiling devices.

C. Install sprinklers a minimum of 36-inches away from air distribution devices.

3.9 IDENTIFICATION

A. Identify piping and system components. Comply with NFPA 13 and requirements for identification materials and installation in Division 15 Section "Identification for Plumbing Systems."

3.10 PAINTING

A. Paint all exposed piping as specified in Division 15 Section "Identification for Plumbing Systems" for identifying piping.

3.11 FIELD QUALITY CONTROL

A. Give 14 days' advance notice for all testing. The Owner and Engineer reserve the right to witness tests.

B. Installation Requirements: For any requirements in this specification that exceed the requirements of industry accepted practices or regulatory minimum conditions, the requirements of this specification shall govern and control. Any materials or workmanship that are found to be deficient of specific codes or standards, or the requirements of this specification, shall be repaired or replaced at the Contractor's expense.

C. Perform the following tests and inspections.

1. Leak Test: After installation, charge systems and test for leaks using compressed air. Subject the piping system to a test pressure of 40 psig for 24 hours. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect fire-suppression systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required and verify fire alarm system notification in accordance with the NFPA 72.

D. Fire-suppression piping system will be considered defective if it does not pass tests and inspections.

E. Prepare written test and inspection reports.

3.12 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

C. Protect sprinklers from damage until Substantial Completion.

END OF SECTION 15330

SECTION 15411 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes the following fixtures and specialties:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.
4. Lavatory faucets.
5. Shower faucets.
6. Supply and waste fittings.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fixtures.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 QUALITY ASSURANCE

A. Plumbing fixtures and components shall comply with NSF 61 for fixture materials that will be in contact with potable water.

1.5 COORDINATION

A. Coordinate locations and roughing-in requirements of plumbing fixtures. Verify that plumbing fixtures can be installed to comply with required clearances and referenced standards.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver plumbing fixtures in manufacturer’s protective packing, crating, and covering.

B. Store plumbing fixtures on elevated platforms in a dry location.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Shower, Flow-Control Fittings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES, GENERAL

A. Provide plumbing fixtures and trim, fittings, components, accessories, and supports as specified herein and indicated in the Plumbing Fixture Schedule on the Drawings.

2.2 FLUSH-VALVE WATER CLOSETS

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

1. American Standard (American Standard Brands).
2. Kohler Company.

B. Description: Floor mounted, top spud inlet.

1. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: Accessible complying with ICC/ANSI A117.1, as indicated on the Drawings.
f. Rim Contour: Elongated.
g. Water Consumption: 1.6 gal. per flush.
h. Spud Size: NPS 1-1/2.

2.3 FLUSHOMETER VALVES

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

1. Sloan Valve Company.
2. Zurn Plumbing Products.

B. Lever-Handle, Diaphragm Flushometer Valves:

1. Standard: ASSE 1037.
2. Minimum Pressure Rating: 125 psig.
3. Features: Integral check stop and backflow-prevention device.

a. With outlet-tube-mounted bedpan washer where indicated on the Drawings.

4. Material: Brass body with corrosion-resistant components.

5. Exposed Flushometer-Valve Finish: Chrome plated.
6. Style: Exposed.
7. Consumption:
   a. 1.6 gal. per flush for water closets.
8. Minimum Inlet: NPS 1.
9. Minimum Outlet: NPS 1-1/4, extended length.

2.4 TOILET SEATS

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

1. American Standard (American Standard Brands).
2. Big John Products, Inc.
3. Church Seats.
4. Kohler Company.
5. Olsonite Seat Company.

B. Description:

1. Standard: IAPMO Z124.5.
2. Material: Plastic with antimicrobial agent.
3. Type: Commercial heavy duty.
4. Shape: Elongated rim, open front.
5. Hinge: Check.
6. Hinge Material: Noncorroding metal.

2.5 LAVATORY MANUALLY OPERATED FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

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

1. American Standard (American Standard Brands).
2. Chicago Faucet Co. (Geberit Group).
3. Kohler Company
4. Moen, Incorporated.
5. Zurn Plumbing Products.

C. Lavatory Faucets: Manual-type, commercial, solid-brass valve.

1. Standard: ASME A112.18.1/CSA B125.1.
2. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
3. Body Material: Commercial, solid brass.
4. Finish: Polished chrome plate.
5. Maximum Flow Rate: As indicated on the Drawings.
6. Valve Handle(s): As indicated on the Drawings.
7. Spout: As indicated on the Drawings.
8. Spout Outlet: As indicated on the Drawings.

2.6 LAMINAR-FLOW, FAUCET-SPOUT OUTLETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout-outlet materials that will be in contact with potable water.

B. Description: Chrome-plated-brass, faucet-spout outlet that produces non-aerating, laminar stream. Include external or internal thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

2.7 SHOWER FAUCETS

A. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

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

1. American Standard (American Standard Brands).
2. Chicago Faucet Co. (Geberit Group).
3. Delta Faucet Co.
4. Kohler Company
5. Moen, Incorporated.
6. Symmons Industries, Inc.

C. Shower Faucets:

1. Faucet:

a. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
b. Body Material: Solid brass.
c. Finish: Polished chrome plate.
d. Maximum Flow Rate: 2.5 gpm.
e. Mounting: Concealed or exposed as indicated on the Drawings.
f. Operation: Single-handle, push-pull, or twist or rotate control as indicated on the Drawings.
g. Antiscald Device: Integral with mixing valve.
h. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water-supply connections.
i. Indicators: For hot and cold water.

2. Shower Heads:

a. Standard: ASME A112.18.1/CSA B125.1.
b. Type: Ball joint and head integral with mounting flange; and hand held, slide bar mounted.
c. Shower Head Material: Metallic with chrome-plated finish.
d. Spray Pattern: Adjustable.
e. Temperature Indicator: Integral with faucet.

2.8 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

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

1. American Valve, Inc.
2. Brass Craft Manufacturing Co. (Masco Corporation).
3. Chicago Faucet Co. (Geberit Group).
4. Engineered Brass Company (Just Manufacturing, Inc.).
5. McGuire Manufacturing Company, Inc.

C. Standard: ASME A112.18.1/CSA B125.1.

D. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

E. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

1. Operation: Loose key or wheel handle as indicated on the Drawings.

2.9 WASTE FITTINGS

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

1. Engineered Brass Company (Just Manufacturing, Inc.).
2. Jay R. Smith Manufacturing Co.
3. Josam Company.
4. McGuire Manufacturing Company, Inc.
5. MIFAB Manufacturing, Inc
6. Watts Regulator (Watts Water Technologies, Inc.) (Watts Industries).
7. Zurn Plumbing Products.

B. Standard: ASME A112.18.2/CSA B125.2.

C. Drain: Grid type with offset and straight tailpiece.

D. Trap:

1. Size: As indicated on the Drawings.
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch thick brass tube to wall; and chrome-plated, brass or steel wall flange.

2.10 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls, floors, cabinets, and counters for suitable conditions where fixtures will be installed.

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

3.2 INSTALLATION

A. Install plumbing fixtures level and plumb according to roughing-in drawings.

B. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install toilet seats on water closets.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet and urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for fixtures with handle mounted on open side of fixture.
4. Install actuators in locations that are easy for people with disabilities to reach.

D. Lavatory Installation:

1. Install lavatories level and plumb according to roughing-in drawings.
2. Install laminar-flow, faucet-spout fittings in faucet spouts where laminar-flow fittings are specified.

E. Shower Installation:

1. Install showers level and plumb according to roughing-in drawings.
2. Assemble shower components according to manufacturers' written instructions.
3. Install shower flow-control fittings with specified maximum flow rates in shower arms.
4. Set shower receptors in leveling bed of cement grout.

F. Install water-supply piping with stop on each supply to each fixture to be connected to water-distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball valve if supply stops are not specified with fixture. Comply with valve requirements specified in Division 15 Section "General Duty Valves for Plumbing Systems."

G. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.

H. Install protective shielding pipe covers on exposed supplies and waste piping of accessible sinks. Comply with requirements in Division 15 Section “Insulation for Plumbing Systems."

I. Seal joints between healthcare plumbing fixtures, counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

J. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. "

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with requirements for water piping specified in Division 15 Section "Domestic Water Piping."

C. Comply with requirements for soil and waste drainage piping specified in Division 15 Section "Sanitary Waste and Vent Piping."

D. Comply with requirements for atmospheric vent piping specified in Division 15 Section "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust plumbing fixtures and controls. Replace damaged and malfunctioning plumbing fixtures, fittings, and controls.

B. Adjust water pressure at faucets and flushometer valves to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After installing plumbing fixtures, inspect and repair damaged finishes.

B. Clean plumbing fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed fixtures and fittings.

D. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 15411

SECTION 15776 - RADIANT-HEATING ELECTRIC PANELS

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 prefabricated radiant-heating electric panels.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.

B. Shop Drawings: For electric heating panels.

1. Include diagrams for power, signal, and control wiring.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 COORDINATION

A. Coordinate layout and installation of radiant-heating panels and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, fire-alarm devices, and other ceiling-mounted devices.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric heating panels to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PREFABRICATED RADIANT-HEATING ELECTRIC PANELS

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

1. Chromalox, Inc.
2. INDEECO, Inc. (Industrial Engineering & Equipment Company, Inc.).
3. Markel, Inc. (TPI Corporation).

B. Description: Sheet-metal-enclosed panel with heating element suitable for lay-in installation flush with T-bar ceiling grid, surface mounting, or recessed mounting. Comply with UL 2021.

1. Panel: Minimum 0.0276-inch thick, galvanized sheet steel back panel riveted to minimum 0.0396-inch thick, galvanized sheet steel front panel with fused-on crystalline surface.
2. Heating Element: Insulated resistive wires.
3. Electrical Connections: Nonheating, high-temperature, insulated-copper leads, factory connected to heating element.
4. Exposed-Side Panel Finish: Baked-enamel finish in manufacturer's standard paint color.
5. Surface-Mounted Trim: Sheet metal with baked-enamel finish in manufacturer's standard paint color.
6. Nominal Panel Size: 24 by 24 inches.
7. Electrical Characteristics for Single-Point Connection:

a. Volts: 120
b. Phase: 1
c. Hertz: 60.

C. Wall Thermostat: Bimetal, sensing elements calibrated from 55 to 90 deg F; with contacts suitable for line-voltage circuit, and manually operated on-off switch with contactors, relays, and control transformers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and substrates to receive electric heating panels for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Ensure surfaces in contact with electric heating panels are free of burrs and sharp protrusions.
2. Ensure surfaces and substrates are level and plumb.

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

3.2 INSTALLATION

A. Install radiant-heating panels level and plumb.

B. Support for Radiant-Heating Panels in or on Grid-Type Suspended Ceilings: Use grid as a support element.

1. Install a minimum of four ceiling-support-system rods or wires for each panel. Locate not more than 6 inches from panel corners.
2. Support Clips: Fasten to panel and to ceiling grid members at or near each panel corner with clips designed for the application.
3. Install at least one independent support rod or wire from structure to a tab on panel. Wire or rod shall have breaking strength of the weight of the panel at a safety factor of 3.

C. Verify locations of thermostats with Drawings and room details before installation. Install devices 48 inches above finished floor.

3.3 CONNECTIONS

A. Ground equipment according to Division 16 Section "Grounding and Bonding."

B. Connect wiring according to Division 16 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operate electric-heating elements through each stage to verify proper operation and electrical connections.
2. Test and adjust controls and safeties.

B. Radiant-heating electric panels will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 PROTECTION

A. Protect installed radiant-heating electric panels from damage during construction.

B. Remove and replace damaged radiant-heating electric panels.

END OF SECTION 15776

SECTION 15815 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

B. Related Sections:

1. Division 15 Section "Duct Accessories" for dampers and flexible ducts.
2. Division 15 Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing requirements for metal ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1.4 SUBMITTALS

A. Product Data: For each type of the following products:

1. Ducts and fittings.
2. Sealants and gaskets.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

C. SMACNA Compliance:

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for fabricating and installing metal ducts.
2. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines" for fabricating, installing, and protecting metal ducts from contamination.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

1. Minimum Allowable Thickness: 24 gauge.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Lock-forming quality.
2. Galvanized Coating Designation: G90.
3. Finishes for Surfaces Exposed to View: Mill phosphatized.

2.4 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Water-Based Joint and Seam Sealant:

1. Sealant: Fiber reinforced acrylic, UL 181 A-M and B-M listed.
2. Application Method: Brush on.
3. Solids Content: Minimum 65 percent plus or minus 2 percent by weight.
4. Shore A Hardness: Minimum 20.
5. Water resistant.
6. Mold and mildew resistant.
7. VOC: Maximum 75 g/L (less water).
8. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
9. Service: Indoor or outdoor.
10. Substrate: Compatible with galvanized sheet steel.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.

5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.5 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

PART 3 - EXECUTION

3.1 DUCT SCHEDULE

A. Fabricate ducts to the following classifications and as indicated below:

1. SMACNA Seal Class: A.
2. ASHRAE Leakage Classification (C_L) for All Ducts Constructed to a Pressure Class of 3-Inches and Below: 6.

B. Supply-Air Ducts Downstream of Terminal Units:

1. Material: Galvanized steel.
2. Pressure Class: Positive 2-inch wg.

C. Return-Air Ducts:

1. Material: Galvanized steel.
2. Pressure Class: Negative 2-inch wg.

D. General Exhaust-Air Ducts:

1. Material: Galvanized steel.
2. Pressure Class: Negative 2-inch wg.

E. Elbow Configuration:

1. Rectangular Supply, Return, and Exhaust Ducts: Comply with SMACNA "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

   a. Radius Type RE 1 with minimum radius-to-width ratio of 1.5.
   b. Mitered Type RE 2 with vanes complying with SMACNA "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Round Supply, Return, and Exhaust, Ducts: Comply with SMACNA "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

   a. Adjustable with minimum radius-to-diameter ratio of 1.5.

F. Branch Configuration:

1. Rectangular Ducts: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

   a. Rectangular Main to Rectangular Branch: 45-degree entry.
   b. Rectangular Main to Round Branch: Spin in.

2. Round Ducts: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

   a. Velocity 1000 fpm or Lower: 90-degree tap.
   b. Velocity 1000 to 1500 fpm: Conical tap.
   c. Velocity 1500 fpm or Higher: 45-degree lateral.

3.2 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install and protect ducts from contamination according to SMACNA's "Duct Cleanliness for New Construction Guidelines."

   1. For ducts serving patient care areas, comply with Advanced Level C requirements.
   2. For ducts serving non-patient care areas, comply with Intermediate Level B requirements.

D. Install round ducts in maximum practical lengths.

E. Install ducts with fewest possible joints.

F. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

G. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

I. Install ducts with a clearance of 2 inches, plus allowance for insulation thickness.

J. Route ducts to avoid passing through electrical equipment rooms and enclosures.

K. Where ducts pass through non-rated building assemblies and are concealed from view, seal the opening between the assembly and duct or duct insulation with gypsum wallboard joint compound.

3.3 DUCT SEALING

A. Seal all ducts to Seal Class A according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal all transverse joints, longitudinal seams, and duct penetrations with joint and seam sealant.

C. Seal ducts prior to applying insulation.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
2. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Support ducts independently of other system components.

E. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

A. Paint interior of metal ducts that are visible through diffusers, registers, and grilles. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

3.7 START UP

A. Air Balance: Comply with requirements in Division 15 Section "Testing, Adjusting, and Balancing."

1. Adjust volume control devices as necessary to achieve required airflow.

END OF SECTION 15815

SECTION 15820 - DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manual volume dampers.
2. Flange connectors.
3. Turning vanes.
4. Flexible air ducts.
5. Duct accessory hardware.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For duct accessories.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

   a. Special fittings.
   b. Manual volume damper installations.

C. Source quality-control reports.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

C. Comply with ANSI/AMCA Standard 500-D-12 testing for damper rating.

D. Comply with ADC “Flexible Duct Performance & Installation Standards”, 5th edition for installing flexible duct.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.

2.2 MANUAL VOLUME DAMPERS

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

1. Air Balance, Inc.
2. Arrow United Industries.
3. Greenheck Fan Corporation.
4. McGill AirFlow (United McGill Corp).
5. Nailor Industries.
6. NCA Manufacturing, Inc.
7. Pottorff.
8. Ruskin Company.
9. Safe-Air/Dowco Products.
10. TAMCO (T.A. Morrison Co., Inc.).

B. Low-Leakage, Steel, Manual Volume Dampers:

1. Comply with AMCA 500-D testing for damper rating.
2. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
   a. Maximum Allowable Leakage: 8 cfm per sf. ft. at 4-inch wg.
3. Suitable for horizontal or vertical applications.
4. Frames:
   a. Rectangular Frames: Hat-shaped, galvanized sheet steel; same gauge as duct but not less than 0.040-inch thick, with mitered and welded corners.
   b. Round Frames: Galvanized sheet steel; 0.079-inch thick.
   c. Flanges for attaching to walls and flangeless frames for installing in ducts.
5. Blades:
   a. Multiple blade.
   b. Opposed-blade design.
   c. Stiffen damper blades for stability.
   d. Galvanized, roll-formed steel; 0.064-inch thick; strengthened by three longitudinal 1-inch deep Vee grooves running the entire length of each blade.

6. Blade Axles: Galvanized steel.
7. Bearings:
    a. Molded synthetic.
    b. Dampers shall have axles full length of damper blades and bearings at both ends of operating shaft.
8. Blade Seals: Vinyl blades seals with silicone rubber on top and bottom blade radii.
9. Jamb Seals: Cambered Aluminum.
10. Tie Bars and Brackets: Galvanized steel.
11. Accessories:
    a. Two-inch stand-off locking device to hold dampers in a fixed position without vibration.

2.3 FLANGE CONNECTORS

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

1. Duro-Dyne Corporation.
2. General Rubber Corporation.
3. US Bellows, Inc.
4. Ventfabrics, Inc.
5. Ward Industries (Hart & Cooley Inc).

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.4 TURNING VANES

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

1. Arrow United Industries (Mestek Inc.).
2. Ductmate Industries, Inc.
3. Kees, Inc.
4. McGill AirFlow (United McGill Corp).
5. Ruskin Company.
6. Ventfabrics, Inc.
7. Ward Industries (Hart & Cooley Inc).

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

D. Vane Construction: Single wall for ducts up to 24 inches wide and double wall for larger dimensions.

2.5 FLEXIBLE AIR DUCTS

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

1. Anco Products, Inc.
2. ATCO Rubber Products, Inc.
3. Flexmaster USA, Inc.
4. Hart & Cooley, Inc.
5. Thermaflex (Flexible Technologies, Inc.)

B. Insulated, Flexible Air Duct: Meeting all testing requirements of UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2004; minimum 6.0.
5. Label: Permanently labeled by manufacturer as “flexible air duct.”

C. Flexible Air Duct Hangers: UL listed, adjustable 1.5-inch-wide support straps constructed of durable composite material with resealable locking clasp.

D. Flexible Air Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action. Comply with UL 181B.

E. Flexible Air Duct Elbow Supports: Universal-mount, 1-piece, fully adjustable, radius-forming brace to support 4-inch through 16-inch diameter flexible ducts. Comply with UL 2043.

1. Material: Copolymer polypropylene.
2. Support Frame Radius: 8-inches.
3. Manufacturer: Build Right Products, "FlexRight" Durable Elbow Support, or approved equal.

2.6 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel.

C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts.

D. Set volume dampers to fully open position before testing, adjusting, and balancing.

E. Install test holes at fan inlets and outlets and elsewhere as indicated.

F. Connect supply diffusers to low pressure supply ducts with maximum 5-foot lengths of flexible air duct. All turns, bends, and offsets shall be installed with a minimum one duct diameter bend radius and shall not exceed 90-degrees. Connect with stainless steel flexible duct clamps. Plastic draw bands are not acceptable.

G. Connect return grilles to return ducts and exhaust grilles to exhaust ducts with maximum 5-foot lengths of flexible air duct. All turns, bends, and offsets shall be installed with a minimum one duct diameter bend radius and shall not exceed 90-degrees. Connect with stainless steel flexible duct clamps. Plastic draw bands are not acceptable.

H. Fully extend all flexible air duct prior to installation. Full extension is achieved when there is no more than 4 percent longitudinal compression of the entire flexible duct run.

I. Support flexible air ducts with 1.5-inch-wide support straps. Wire supports are not acceptable.

J. Do not install flexible air ducts through building assemblies.

K. Install duct test holes where required for testing and balancing purposes.

END OF SECTION 15820

SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes ceiling and wall mounted diffusers, registers, and grilles.

B. Related Sections:

1. Division 15 Section "Duct Accessories" for volume-control dampers not integral to diffusers, registers, and grilles.
2. Division 15 Section "Testing, Adjusting, and Balancing" for balancing diffusers, registers, and grilles.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For diffusers, registers, and grilles to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 DIFFUSERS, REGISTERS, AND GRILLES

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

1. Anemostat (Mestek, Inc.)
2. Carnes Company
3. Krueger (Tomkins, PLC)
4. MetalAire (Metal Industries, Inc.)
5. Nailor Industries.
6. Price Industries
7. Titus (Tomkins, PLC)

B. Louvered and Plaque Diffusers:

1. Devices shall be specifically designed for variable-air-volume flows.
2. Material: Steel or aluminum as indicated on the Drawings.
3. Finish: Powder coat, white.
4. Face Size: As indicated on the Drawings.
5. Duct Inlet: As indicated on the Drawings
6. Face Style: As indicated on the Drawings
7. Mounting: Surface or T-bar as indicated on the Drawings.
8. Pattern: Fixed.
9. Dampers: Radial opposed blade or butterfly if/as indicated on the Drawings.

C. Perforated and Eggcrate Grilles:

1. Devices shall be specifically designed for variable-air-volume flows.
2. Material: Steel or aluminum as indicated on the Drawings.
3. Finish: Powder coat, white.
4. Face Size: As indicated on the Drawings.
5. Duct Inlet: As indicated on the Drawings.
6. Face Style: Flush.
7. Mounting: Surface or T-bar as indicated on the Drawings.
8. Dampers: Radial opposed blade or butterfly if/as indicated on the Drawings.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

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

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.4 CLEANING

A. After installation, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 15855

SECTION 15950 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TAB Agency: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

A. Qualification Data: Within 14 days of Contractor's Notice to Proceed, submit documentation that the TAB agency and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Certified TAB Reports: Submit one hard copy and one electronic copy of reports prepared, as specified in this Section, on approved forms certified by TAB agency.

1. For phased projects, submit report for each phase of the project.
2. At the completion of all phases of the project, submit a final report for the entire project that consolidates the reports of all phases.

C. Sample Report Forms.

D. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

E. Warranties.

1.5 QUALITY ASSURANCE

A. TAB Agency Qualifications: Engage a TAB agency certified by AABC or NEBB.

1. TAB Engineer: Employee of the TAB agency and certified by AABC or NEBB as a TAB engineer.
2. TAB Technician: Employee of the TAB agency and who is certified by AABC or NEBB as a TAB technician.

B. The TAB agency shall be independent of those contractors and subcontractors furnishing or installing the systems to be balanced. The TAB agency shall specialize in the testing and balancing of heating, ventilating, and air-conditioning systems; and shall test, adjust, and balance all mechanical systems as herein specified. Final test measurements shall be conducted in the presence of the Engineer, and the Engineer shall have the authority to reject test results and require any reasonable measures to insure the systems perform as designed.

C. Acceptable TAB Agencies: The following TAB agencies are acceptable agencies to provide TAB services for the project.

1. Comfort Control, Inc.
2. Palmetto Air & Water Balance.
3. Research Air Flo, Inc.
4. The Phoenix Agency of North Carolina, Inc.

D. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

E. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.

F. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems."

G. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.

1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

C. Phased Construction: Perform TAB for each phase of the project. After completion of all phases of the project, re-check and verify settings for previously completed phases and make adjustments as necessary.

1. For phased projects, submit report for each phase of the project.
2. At the completion of all phases of the project, submit a final report for the entire project that consolidates the reports of all phases.

1.7 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

1.8 WARRANTY

A. General Warranty: The performance guarantee specified in this article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB agency fails to comply with the Contract Documents. Guarantee includes the following provisions:

1. The certified TAB agency has tested and balanced systems according to the Contract Documents.
2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed manual volume dampers. Verify that locations are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

F. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Complete system-readiness checks and prepare reports. Verify the following:

1. Automatic temperature-control systems are operational.
2. Equipment and duct access doors are securely closed.
3. Balance dampers are open.
4. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
5. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.

C. Mark balancing devices with paint or other suitable, permanent identification material to show final settings.

D. All repairs and adjustments required shall be completed before submitting TAB report to the Engineer. Include an extended warranty of 180 calendar days after completion of TAB work, during which time the Engineer, at his discretion, may request a recheck or resetting of any outlet as listed in TAB report. Provide technicians to assist the Engineer in making any tests required during this period of time. This recheck shall also include a spot check of the actual field balance with the Engineer. Allow for spot checking 10 percent of documented flow rates.

E. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Obtain manufacturer's outlet factors and recommended testing procedures.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Check for airflow blockages.

E. Verify that air duct system is sealed as specified in Division 15 Section "Metal Ducts."

3.5 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Balance the renovation work to airflows indicated on the Drawings.

3.6 TOLERANCES

A. Set HVAC system's air flow rates and within the following tolerances:

1. Air Outlets and Inlets: Plus or minus 10 percent.
2. Minimum Air Change Rates and/or Pressurization Requirements: Ensure minimum air change rates and/or pressurization requirements are met for rooms requiring such, regardless of tolerances specified above.

3.7 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB agency.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Notes to explain why certain final data in the body of reports vary from indicated values.

C. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of supply, return, and exhaust airflows.
2. Duct, outlet, and inlet sizes.
3. Position of balancing devices.

D. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

   a. System and air-handling-unit number.
   b. Location and zone.
   c. Traverse air temperature in deg F.
   d. Duct static pressure in inches wg.
   e. Duct size in inches.
   f. Duct area in sq. ft.
   g. Indicated air flow rate in cfm.
   h. Indicated velocity in fpm.
   i. Actual air flow rate in cfm.
   j. Actual average velocity in fpm.
   k. Barometric pressure in psig (Pa).

E. Terminal Unit (Constant-Volume and Variable-Air-Volume) Test Reports:

1. Unit Data:

   a. System and air-handling unit identification.
   b. Location and zone.
   c. Apparatus used for test.
   d. Area served.
   e. Make.
   f. Number from system diagram.
   g. Type and model number.
   h. Size.

2. Test Data (Indicated and Actual Values):

   a. Maximum air flow rate in cfm.
   b. Minimum air flow rate in cfm.
   c. Preliminary maximum air flow rate as needed in cfm.
   d. Preliminary minimum air flow rate as needed in cfm.
   e. Final maximum air flow rate in cfm.
   f. Final minimum air flow rate in cfm.
   g. Space temperature in deg F.

3. Reheat Coil Test Data (Indicated and Actual Values):

   a. Air flow rate in cfm.
   b. Air pressure drop in inches wg.
   c. Entering-air temperature in deg F.
   d. Leaving-air temperature in deg F.
   e. Water flow rate in gpm.
   f. Water pressure drop in feet of water or psig.
   g. Entering-water temperature in deg F.
   h. Leaving-water temperature in deg F.

F. Air Distribution Device Test Reports:

1. Unit Data:

   a. System and air-handling unit identification.
   b. Location and zone.
   c. Apparatus used for test.

d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Air velocity in fpm.
c. Preliminary air flow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final air flow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

G. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.8 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
c. Measure sound levels at two locations.
d. Measure space pressure of at least 10 percent of locations.
e. Verify that balancing devices are marked with final balance position.
f. Note deviations to the Contract Documents in the Final Report.

B. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB agency to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB agency's final payment.

C. Prepare test and inspection reports.

3.9 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 15950

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 01:

1. Submittals.
2. Coordination drawings.
3. Tests and inspections.
4. Record drawings.
5. Operation and maintenance manuals.
6. Rough-in.
7. Access.
8. Electrical installations.
9. Cutting and patching.
10. Temporary services.
11. Cleaning.

1.3 CODES AND STANDARDS

A. Codes and standards referenced in the Construction Documents shall be the latest edition of the code or standard in effect as of the original release date of the Construction Documents, unless specifically indicated otherwise.

B. Codes and standards referenced in the Construction Documents shall be used as minimum construction requirements. Where the Construction Documents indicate more stringent construction requirements than a referenced code or standard, the requirements of the Construction Documents shall govern and be followed.

1.4 SUBMITTALS

A. General: Follow the procedures specified in Division 01 Section "Submittals."

B. If a fault current study is required under a separate specification section, that completed fault current study shall be submitted prior to submittal of any electrical switchboards, panelboards or automatic transfer switches.

C. If submittal sheet from a catalog is submitted and shows multiple items or multiple classifications or types of the same item, the item submitted SHALL BE CLEARY MARKED with a red arrow pointing to the item submitted. Submittals with more than one item on a sheet with out the submitted item being CLEARLY MARKED as the item submitted, will be returned as “revise and resubmit”.

1.5 COORDINATION DRAWINGS

A. General: Follow the procedures specified in Division 01 Section “Project Coordination”.

1.6 TESTS AND INSPECTIONS

A. Give 14 days' advance notice for all testing and inspections required by the individual work sections. The Owner and Engineer reserve the right to witness all tests.

B. Codes and standards referenced in the Construction Documents for tests and inspections shall be used as minimum testing and inspecting requirements. Where the Construction Documents indicate more stringent testing and inspecting requirements than a referenced code or standard, the requirements of the Construction Documents shall govern and be followed.

C. Codes and standards referenced in the Construction Documents for tests and inspections shall be used as minimum testing and inspecting requirements. Where the Construction Documents indicate more stringent testing and inspecting requirements than a referenced code or standard, the requirements of the Construction Documents shall govern and be followed.

D. Prepare written reports of all tests and inspections required by the individual work sections.

E. Initial Reports: Submit one (1) electronic PDF copy of each test and inspection report within seven days’ of completing the test or inspection for review by the Engineer. Handwritten initial reports are acceptable.

1. Allow seven days for the Engineer’s review of the initial report of each test and inspection.

F. Final Reports: Prepare typed final reports of all tests and inspections. Handwritten final reports are not acceptable. At the completion of the project, prepare a compiled report of all tests and inspections performed for the electrical systems. Tabulate and divide the reports into separate sections organized by the individual work section that required the test or inspection. In addition to individual test and inspection reports, include the following data:

1. Title page with report date.
2. Project name.
3. Project location.
4. Architect's name and address.
5. Engineer's name and address.
6. Contractor's name and address.
7. Table of contents.

G. Submit one (1) electronic PDF copy and one (1) hard copy bound in a three-ring binder of all Final Reports as part of the closeout documents specified in Division 01 Section “Project Closeout”.

1. The cover and the end of the binder shall be identified with the project name.

1.7 RECORD DRAWINGS

A. General: Follow the procedures specified in Division 01 Section “Project Closeout”.

B. Prepare record drawings to indicate the following installed conditions:

1. Underground feeder locations.
2. Concealed feeder locations.
3. Panelboard, switchboard and MCC schedules.
4. All circuits.
5. All equipment locations.
6. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
7. All systems riser and control diagrams.

1.8 OPERATION AND MAINTENANCE MANUALS

A. General: Follow the procedures specified in Division 01 Section “Project Closeout”.

B. Prepare operation and maintenance manuals include the following information:

1. Manufacturer's printed operating procedures. Include start-up, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
2. Sequence of operation detailed description.
3. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
4. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
5. Servicing instructions and lubrication charts and schedules.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Retain shipping protective covers during storage.

C. Comply with equipment manufacturer's written installation instructions for handling.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. Equipment and materials, unless specified otherwise, shall be new and be the standard products of the manufacturer. Seconds, rejects, or damaged materials are not acceptable.

B. Equipment and materials shall be the standard commercial grade product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer.

C. The listing of a manufacturer for certain equipment and materials does not indicate acceptance of standard or catalogued item. All equipment and materials shall conform to the specifications and are subject to prior review and approval by the Engineer.

2.2 UL LISTING

A. Wherein equipment is specified to be UL listed, the entire assembly shall be listed by Underwriters Laboratories, Inc. Any modifications to suit the intent of the specifications shall be performed in accordance with the National Electric Code and listed by UL.

B. If UL listing is not available for any given piece of equipment, notify the Engineer who will discuss with the Owner to resolve the issue.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-in of equipment and material with field measurements and with the requirements of the actual equipment and material to be installed. Follow manufacturer's written installation instructions.

B. Refer to Divisions 2 through 16 specifications for rough-in requirements of specified equipment and material.

3.2 ACCESS

A. Generally, all concealed equipment and material requiring maintenance and/or operation are located above accessible type ceilings, or are exposed. Should any such elements be inaccessibly located in ceilings or walls, provide 24 by 24-inches square access doors (whether shown on the Drawings or not) with flush screwdriver operated lock to permit complete access. Doors shall be of the type suited to the construction into which they are to be installed and shall conform with the type and quality of doors and panels specified in Division 8.

B. Division 16 Contractors are responsible for furnishing and locating all access doors and panels for all inaccessibly concealed equipment and material. General Contractor is responsible for installation of all access doors and panels furnished by Division 16 Contractors.

3.3 ELECTRICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of Electrical systems, materials, and equipment. Comply with the following requirements:

1. Provide and maintain temporary partitions or dust barriers adequately to prevent the spread of dust and dirt to adjacent areas.
2. Verify all dimensions by field measurements.
3. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible, while allowing for proper drainage.
4. Install systems, materials, and equipment to comply with approved submittal data, including coordination drawings. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, notify the Engineer of the conflict.
5. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

6. Install equipment and material to facilitate servicing, maintenance, and repair or replacement of components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
7. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
8. Provide access doors and panels for all inaccessibly concealed equipment and material behind finished surfaces.
9. Where structural steel fireproofing is removed or damaged as a result of demolition or construction activities, patch and repair the fireproofing as required to match the type and thickness of adjacent undisturbed fireproofing material.
10. Install all equipment so that all code required and manufacturer recommended servicing clearances are maintained. Contractor is responsible for the proper arrangement and installation of all equipment within any designated space. Should the Contractor determine that a departure from the Contract Documents is necessary, Contractor shall submit to the Designer, for approval, detailed drawings of his proposed changes with his written reasons for the changes. No changes shall be implemented by the Contractor without the issuance of the required Bulletin Drawings or clarifications.
11. Electrical equipment shall be protected from the weather, in particular dripping or splashing water, at all times during shipment, storage, and construction. Manufacturer's recommendations with regard to storage and protection shall be followed. Should any apparatus be subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test, at the expense of the Contractor, to ascertain the suitability of the apparatus, or it shall be replaced without additional cost to the Owner.
12. Inspect all electrical equipment and materials prior to installation. Damaged equipment and materials shall not be installed or placed in service. Replace or repair to new condition and test damaged equipment in compliance with industry standards at no additional cost to the Owner. Equipment required for any such testing shall be provided by the Contractor.
13. Wherever any work pierces waterproofing, it shall be installed in a manner to maintain the integrity of the waterproofing. Coordinate roofing materials which pierce roof for compatibility with membrane or other roof types with General Contractor.
14. In all cases where the conductor size has been increased to compensate for voltage drop and/or the conductor size is larger than the available lug size on a new or existing termination, provide a NEC sized junction box just ahead of that termination and reduce the wire size down to the maximum wire size listed for the termination lug. Keep the reduced wire size length to the minimum length possible. Provide UL listed insulated in line compression splices in the junction box with heat shrink insulation. Split bolt splices shall not be permitted. Do not cut strands off a stranded conductor to allow it to fit into a lug. In all cases the reduced wire size shall have ampacity larger than the circuit breaker or fuse protecting the circuit.
15. When adding circuit breakers to existing panels or switchboards, provide circuit breakers of the same manufacturer of the existing panel or switchboard, match the highest rated AIC rating of any existing circuit breakers in the panel or switchboards. Provide all mounting hardware as required to mount the circuit breaker. Provide dual breaker mounting hardware to mount new and adjacent existing circuit breaker if/as necessary. Drawings indicate the trip size of the circuit breaker required, not the frame size. Provide circuit breaker frame size to fit the space available, if the space available requires a larger frame size than trip rating called for, provide the larger frame size with a trip unit sized as specified. Provide all blank filler plates as required to completely cover the remaining panel trim. Relocate existing circuit breakers and extend existing circuits as required to make room for new circuit breaker. Provide new typed panel or switchboard schedule showing all panel or switchboard circuit changes. If circuit breakers for panel or switchboards are no longer available from the manufacturer, provide certified rebuild circuit breakers. Visit the jobsite and inspect the existing panels and switchboards that circuit breakers are to be added to prior to bid, provide aid of panel or switchboard

manufacture as required to determine correct circuit breaker type for the panel or switchboard. Provide ground fault circuit breaker if other circuit breakers in panel of switchboard have ground fault.

3.4 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with the "General Conditions of the Contract for Construction" and Division 01 specifications. In addition to requirements specified in those documents, the following requirements apply:

1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
2. Minimize Noise: Core drill/saw cut concrete to avoid the use of jack hammers. Provide electrically powered welding machines in lieu of gas/diesel engines where receptacles are available.

B. Perform cutting and patching for electrical equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Architect and/or Engineer, uncover and restore Work to provide for observation of concealed Work.

C. Cut, remove and legally dispose of selected equipment, components, and materials indicated to be demolished, and other components made obsolete by the new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

3.5 TEMPORARY SERVICES

A. Provide temporary electrical services and lighting as detailed in Division 01 of these Specifications, and as specifically required to maintain progress of all trades and protect existing facilities.

3.6 CLEANING

A. Prior to final acceptance of the project by the Owner, clean all equipment (inside and out) of all construction dust, dirt, and debris.

B. Prior to final acceptance of the project by the Owner, clean all lighting fixtures and lenses of all construction dust, dirt, and debris. Replace all lamps in existing fixtures to remain. See the "Lighting Fixture Schedule" on the Drawings.

END OF SECTION 16010

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

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. Grout.
2. Electrical demolition.
3. Equipment installation requirements common to equipment sections.
4. Painting and finishing.
5. Concrete bases.
6. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than electrical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and electrical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 QUALITY ASSURANCE

A. Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting electrical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are appropriately increased. No additional costs will be approved for these increases, if larger equipment is approved. The Contractor is solely responsible for the form, fit, and function of substituted equipment. Any additional design cost incurred due to substituted equipment or other project changes shall be at the Contractor's expense.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Electrical equipment shall be delivered to and stored in a dry space, do not store electrical equipment outdoors. Provide heat inside stored electrical equipment to prevent condensation.

B. Protect all equipment and material from dirt, debris, and moisture.

1.6 COORDINATION

A. Coordinate installation of electrical systems, equipment and materials with other building components.

B. Notify the Owner of any system shutdowns three weeks prior to the shutdown, and coordinate shutdown requirements with the Owner. Obtain written approval from the Owner prior to proceeding with the shutdown.

C. Coordinate with the Owner and Engineer for all required systems testing. Notify the Owner and Engineer two weeks prior to all testing.

D. Arrange for adequate spaces, chases, slots, and openings in building structure during progress of construction, to allow for electrical installations.

E. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

F. Coordinate, sequence, and integrate installations of electrical equipment and materials for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.

G. Coordinate connection of electrical services.

H. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

I. Coordinate installation of identifying devices after completing covering and painting where devices are applied to surfaces. Install identifying devices prior to installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.2 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 ELECTRICAL DEMOLITION

A. Refer to Division 1 Sections "Cutting and Patching" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove electrical systems, equipment, and components indicated to be removed.

1. Raceways to Be Removed: Remove raceways (conduit and wire) of circuits indicated to be removed back to source.
2. Equipment to Be Removed: Disconnect and cap services and remove equipment.
3. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
4. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If raceways or equipment to remain are damaged in appearance or are unserviceable as a result of demolition activities, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

D. Repair and/or patch all openings in building assemblies (walls, floors, ceilings, roofing, etc.) where electrical components are demolished. Use similar materials as existing construction.

3.2 ELECTRICAL SYSTEMS INSTALLATION - COMMON REQUIREMENTS

A. Install and support raceways independently of other system components.

B. Do not allow other system components to be supported from, or come in contact with, fire-suppression system piping and components. Fire-suppression system piping and components shall be completely isolated from all other system components.

3.3 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install electrical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.

3.4 PAINTING

A. Paint electrical systems, equipment, and components as specified in other sections of this specification.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 CONCRETE BASES

A. Interior Concrete Bases: Provide concrete bases for all floor-mounted equipment. Anchor equipment to concrete base according to equipment manufacturer's written instructions.

1. Unless indicated otherwise, construct 6-inch high concrete bases with chamfered edges of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Unless indicated otherwise, install #4 reinforcing bars in concrete bases spaced at 12-inches on-center in each direction.
3. 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.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement.
8. Bases installed under this division shall be painted. Provide one coat of concrete primer and two coats of concrete paint. Base color shall be chosen by the owner.

B. Exterior Concrete Bases: Provide concrete bases for all grade-mounted equipment. Anchor equipment to concrete base according to equipment manufacturer's written instructions.

1. Unless indicated otherwise, construct 8-inch high concrete bases with chamfered edges of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Excavate soil to 4-inches below grade and shape trench bottoms to provide uniform bearing and support of concrete bases.
3. Unless indicated otherwise, install #4 reinforcing bars in concrete bases spaced at 12-inches on-center in each direction; top and bottom.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement.

C. Paint concrete bases according to the requirements specified in Division 9 Section “Painting.” Confirm color(s) with the Owner prior to application.

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment. All outdoor metal supports shall be galvanized.

3.7 GROUTING

A. Mix and install grout for electrical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 16050

SECTION 16062 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes hangers and supports for electrical equipment and systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

   a. Hangers.
   b. Steel slotted support systems.
   c. Nonmetallic support systems.
   d. Trapeze hangers.
   e. Clamps.
   f. Turnbuckles.
   g. Sockets.
   h. Eye nuts.
   i. Saddles.
   j. Brackets.

2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Trapeze hangers. Include product data for components.
2. Steel slotted-channel systems.
3. Nonmetallic slotted-channel systems.
4. Equipment supports.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For hangers and supports for electrical systems.

1. Include design calculations and details of trapeze hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which hangers and supports will be attached.
3. Size and location of initial access modules for acoustical tile.
4. Items penetrating finished ceiling, including the following:

   a. Lighting fixtures.
   b. Air outlets and inlets.
   c. Speakers.
   d. Sprinklers.
   e. Access panels.
   f. Projectors.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M.
2. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze conduit hanger and support systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple conduits capable of supporting combined weight of supported systems, conduit, and wire. Size so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.

1. Material: Cadmium plated steel unless otherwise noted. Galvanized steel on all outdoor uses.
2. Channel Width: As required for load.
3. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported. All hangers, clamps and fittings shall be UL listed for the purpose. Use of perforated pipe strap or wire hangers is NOT acceptable.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored 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 made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used. Use stainless steel anchors in highly corrosive areas.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: springhead type.
7. Hanger Rods: Threaded steel only. ¼” minimum size.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section "Raceways and Boxes."

C. Support raceways independently of other system components.

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as scheduled in NECA 1, where its Table 1 lists maximum spacing’s that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Above ceiling conduits shall be supported from structure above and shall not be run on or supported by wall studs or walls above the ceiling.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69 .
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

C. All slotted steel supports shall have the plastic insert installed in the ends to protect personel from edges. Plastic inserts are not required on slotted supports above 7’ above the floor.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils

B. Touchup: Comply with requirements in "Exterior Painting", "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 16062

SECTION 16075 - ELECTRICAL IDENTIFICATION

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. Extent of electrical identification work is indicated herein and by the Drawings and Schedules.

B. Types of electrical identification work specified in this section include the following:

1. Identification for raceways and boxes.
2. Identification of power, control, and communications cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and danger signs.
6. Equipment/system identification labels.
7. Miscellaneous identification products.
8. Identification of equipment housekeeping pads.

1.3 ACTION SUBMITTALS

A. General: Submit each item in this section in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data: For each type of product specified. Submit data for Brady label maker and tape.

C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

D. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of electrical identification products of types required.

B. Comply with NFPA 70 as applicable to installation of identifying labels and markers for wiring and equipment.

C. UL Compliance: Comply with applicable requirements of UL Std 969, "Marking and Labeling Systems," pertaining to electrical identification systems.

D. NEMA Compliance: Comply with applicable requirements of NEMA Std No's. WC-1 and WC-2 pertaining to identification of power and control conductors.

E. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

F. Comply with ANSI Z535.4 for safety signs and labels.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Do not use architectural room numbers, use final room numbers issued by the owner.

C. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

D. Coordinate installation of identifying devices with location of access panels and doors.

E. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide electrical identification products of one of the following or an approved equal:

1. Brady, W.H. Co.
2. 3M Corp.

2.2 RACEWAY IDENTIFICATION MATERIALS

A. Paint: Identify conduits at 10 ft. on center and within 6 inches of any box, wall penetration, ceiling penetration, or floor penetration. Identify with 1” band of paint. Paint junction boxes and covers.

2.3 CONDUCTOR AND CABLE IDENTIFICATION MATERIALS

A. General: Provide manufacturer's standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type, either pre-numbered plastic coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification.

2.4 UNDERGROUND-LINE WARNING TAPE

A. General: Manufacturer's standard permanent, bright colored, continuous printed plastic tape, intended for direct burial service, not less than 6" wide x 4 mils thick.

B. Compound for permanent direct-burial service.

C. Embedded continuous metallic strip or core.

D. Provide tape with printing which most accurately indicates type of service of buried conduit.

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Electrical Lines: Red-Colored Tapes.
3. Communications: Orange-Colored Tapes.

2.5 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Baked-Enamel Warning and Danger Signs:

1. General: Provide manufacturer's standard "DANGER" signs of baked enamel finish on 20-gage steel; of standard red, black and white graphics, 14" x 10" size except where 10" x 7" is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation working, e.g., HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH

2. Warning label and sign shall include, but are not limited to, the following legends:
   a. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
   b. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR XX INCHES." (XX – for less than 250V to ground use 36", for over 250V to ground use 42")

C. Self Adhesive Vinyl Warning Label:

1. Arc Flash Label: "WARNING – ARC FLASH HAZARD. – APPROPRIATE PPE REQUIRED. – FAILURE TO COMPLY CAN RESULT IN DEATH OR INJURY. – REFER TO NFPA 70E."

2.6 EQUIPMENT IDENTIFICATION NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved letters on contrasting background color:

B. Letter Size:

1. Equipment name line: 1/2 Inch high letters
2. Additional lines: 1/4 inch high letters

C. Minimum nameplate thickness: 1/8 inch.

2.7 RECEPTACLE AND SWITCH LABELS

A. Product Description: Pressure sensitive, white tape with ¼" printed letters.

1. Normal Branch: Panel and circuit number shall be labelled on face with black text.
2. Essential system branches: Panel and circuit number shall be labelled on face with red text.

2.8 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon cable ties with the following features:

1. Minimum Width: 3/16 inch (5 mm).
2. Loop Tensile Strength: 50 lbs. (22.3 kg) minimum.
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: As indicated where used for color-coding.

B. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.

1. Minimum Width: 3/16 inch (5 mm).
2. Loop Tensile Strength: 50 lbs. (22.3 kg) minimum. a
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: As indicated where used for color-coding.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

2.10 LETTERING AND GRAPHICS

A. General: Coordinate names and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Do not use architectural room numbers, use final room numbers issued by the owner.

B. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/maintenance of electrical systems and equipment.

C. Do not use abbreviations.

D. All lettering shall be upper case.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General Installation Requirements.

1. For all room identification in panelboard directories, nurse call system, F.A. system, etc., DO NOT use architectural room numbers, obtain the final hospital room numbers from the hospital.
2. Install electrical identification products as indicated, in accordance with manufacturer's written instructions and requirements of the NEC.
3. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.
4. Apply identification devices to surfaces that require finish after completing finish work.
5. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
6. Attach signs and labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

B. System Identification Color-Coding Bands for Raceways:

1. Each color-coding band of paint shall be 10 feet on center, shall be 1” wide, and shall completely encircle conduit. Locate bands within 6 inches of any box, wall penetration, ceiling penetration, or floor penetration.
   a. Systems Requiring Raceways Color-Coding Paint Bands:
      1) Power Circuits
         a) Life Safety Branch.

b) Critical Branch.
c) Automatic Equipment Branch.
d) Manual Equipment Branch.
e) Normal Power.

2. All painted bands on exposed conduits shall be taped so as not to allow overspray and yield neat consistent 1" side bands. Painted bands in non-exposed areas need not be taped.
3. Label all conduits with circuit number at panel and equipment using permanent black ink marker.

C. System Identification Labels for Raceways, Other systems (not listed in Power Circuits or Secondary Systems above):

1. Using a label maker provide yellow labels with black upper case ½" high lettering indicating "TYPE OF SYSTEM". The label shall be large enough to wrap completely around the circumference of the conduit, and the wording "TYPE OF SYSTEM" shall be printed on the label a minimum of 3 times so it can be seen from any angle looking at the conduit. The labels shall be installed at 20 foot intervals along the entire length of the conduit and on all junction boxes. Systems to be labeled in this manner shall include, but not limited to:
   a. Fire Alarm.
   b. Nurse Call.
   c. Door controls
   d. CCTV
   e. Security

D. Identification for Conductors / Cables:

1. General: Apply cable/conductor identification, including feeder number, on each cable/conductor in each box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided.
2. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project's electrical work.

E. System Identification Color-Coding for junction boxes and outlet boxes:

1. Paint each junction box and outlet box in the designated color.
2. All junction boxes and covers are to be labeled to identify system. Boxes containing power circuits are to be labeled using panelboard designation and circuit number (i.e., "BHMA-10"). Boxes containing controls shall be labeled using type of control (i.e., "Air Handler Control"). Inside of each box shall be labeled with permanent black ink marker. Outside of box cover shall be labeled with permanent black ink marker when box is above a lay in ceiling. All exposed boxes in occupied space (chiller rooms, electrical rooms, etc.) shall be labeled neatly with an approved label maker in Arial font. Do not paint covers.

F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

G. Underground-Line Warning Tape:

1. During backfilling / top soiling of each exterior underground conduit, install continuous underground-line warning tape located directly over buried line at 6 to 8 inches (150 to 200 mm) below finished grade.
2. Install line marker for all buried conduits.

H. Equipment/System Identification:

1. All electrical equipment shall be labeled on the outside of the enclosure or equipment to identify system. Provide labels on **all** electrically powered equipment fed on project, regardless of what division provided the equipment. Pressure sensitive, color impregnated tape shall be used for all labels.
2. Panel/Equipment/System Identification. Exterior labels shall indicate panel or equipment name, branch, voltage, source, and source location.
   PANEL NAME OR EQUIPMENT NAME
   LIFE SAFETY, CRITICAL, AUTOMATIC EQUIPMENT, MANUAL EQUIPMENT OR NORMAL BRANCH
   120/208 VOLTS OR 277/480 VOLTS
   FED FROM XXXXX
   LOCATED IN XXXXX

   All panelboards shall also be labeled in the inside of the panel, so as to be visible when the panel cover is removed, with system color coded label indicating the panel name and the source and location it is fed from. The size and font of the interior label may be adjusted to fit the space available but must be obvious and legible.
3. Transfer Switch label shall include the following:
   ATS - XXX
   LIFE SAFETY, CRITICAL, AUTOMATIC EQUIPMENT OR MANUAL EQUIPMENT BRANCH
   120/208 VOLTS OR 277/480 VOLTS
   FED FROM NORMAL POWER XXXX AND EMERGENCY POWER XXXX
   LOCATED IN XXXX
   FEEDS XXXX
   LOCATED IN XXXX
4. Switchboard circuit breakers and Motor Control Center circuit breakers shall be labeled to identify the item it feeds and the location of the item.
   FEEDS DISCONNECT FOR CHILLED WATER PUMP
   LOCATED IN XXXX
   Text of first line of label shall be 3/8” high.
   Text of remaining lines of label shall be 1/4”high

I. Fire Alarm System Panels shall be labeled using pressure sensitive, color-impregnated tape.

J. Receptacles shall be labeled as follows using pressure sensitive, color-impregnated tape:

1. Essential system receptacles - white with red 1/4” lettering.
2. Normal receptacles – white with black 1/4” lettering.

K. Identification and Warnings shall be provided:

1. General: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems, and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls and devices.
2. On all electrical equipment as required by the National Electrical Code including, but not limited to, sections 110.16 and 110.24.
3. Where instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.
4. Equipment with Multiple Power or Control Sources: Apply warning signs to door or cover of equipment including, but not limited to, the following:
   a. Controls with external control power connections.

b. Transfer switches.
c. Isolated power panels fed from two sources.

L. Housekeeping pads

1. Edge all housekeeping pads with yellow warning tape or paint.

3.2 IDENTIFICATION SCHEDULE

A. System Identification Color-Coding Paint Bands for Raceways:

1. Power Circuits

a. Life Safety Branch – Green paint.
b. Critical Branch – Red paint.
c. Automatic Equipment Branch – Yellow paint.
d. Manual Equipment Branch – Blue paint.
e. Normal Power – Black paint.

2. Other systems: refer to 3.1 C above

B. System Identification Color-Coding for Conductors:

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral: White
5) Ground: Green

c. Colors for 480/277-V Circuits:

1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.
4) Neutral: Gray
5) Ground: Green

d. Color coding of isolated power systems conductors shall be per NEC Article 517.160.
e. Field-Applied, Color-Coding Conductor Tape (where specified): Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
f. Switch leg travelers: Purple
g. **IMPORTANT:** Coordinate phase colors with Hospital Engineering Department before proceeding with work. Get signed receipt on agreed upon color code, present to Engineer before pulling wire

C. System Identification Color-Coding for junction boxes and outlet boxes:

1. Power Circuits

a. Life Safety Branch – Green paint.
b. Critical Branch – Red paint.

c. Automatic Equipment Branch – Yellow paint.
d. Manual Equipment Branch – Blue paint.
e. Normal Power – Black paint.

2. Other systems: refer to 3.1 C above

D. Fire Alarm System Devices and Panels:

1. Fire Alarm Devices: Zone numbers shall be white with red lettering and mapnet numbers shall be white with black lettering. Lettering to be 1/4" high.
2. Fire Alarm panels: Red with white 3/8"lettering.

E. Receptacles shall be labeled as follows:

1. Essential system receptacles - white with red 1/4" lettering.
2. Normal receptacles – white with black 1/4" lettering.

F. Equipment Identification Labels: Label colors to match the following:

1. Life Safety Branch: Green with white lettering.
2. Critical Branch: Red with white lettering.
3. Automatic Equipment Branch: Yellow with white lettering.
4. Manual Equipment Branch: Blue with white lettering.
5. Normal Power: Black with white lettering.
6. Emergency Power before Transfer Switch: White with red lettering.

3.3 PANEL, SWITCHBOARD, MCC AND EQUIPMENT DIRECTORIES

A. Create a directory for each type of distribution to indicate type of installed circuit loads (receptacles, lights, equipment, motor, etc.) and the location of the load. Obtain from Owner and incorporate Owner's final room designations, do not use architectural room numbers. Include all room numbers served with type of load, example: receptacles room 301, 302, and 303. Include all equipment numbers and names on all equipment, example: FCU # 3 room 301. Do not copy the schedule from the drawings, create a directory based on actual field wiring and incorporate all information required. Use a computer program to create directory; handwritten directories are not acceptable. Provide a final digital copy in a pdf format and a digital copy in a format that can be updated, of all panel schedules to owner.

END OF SECTION 16075

SECTION 16120 –SECONDARY CONDUCTORS

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. Extent of work of the materials specified in this section is indicated by the Drawings and Schedules.

B. Unless specifically indicated, all secondary conductors shall be to be installed in conduit.

C. Types of electrical conductor, lugs, and connectors specified in this section include but are not limited to the following:

1. Copper conductors, rated 600 V and less
2. Tap type connectors.
3. Split-bolt connectors.
4. Wirenut connectors.
5. Compression connectors.
6. Compression lugs.

D. Applications of electrical conductor and connectors required for this Project include but are not limited to the following:

1. For power distribution circuits.
2. For building lighting circuits.
3. For appliance and equipment circuits.
4. For motor-branch circuits.

1.3 ACTION SUBMITTALS

A. General: Submit each item in this section in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data: For each type of product specified and utilized.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

B. Manufacturers: Firms regularly engaged in manufacture of electrical conductor products of types, sizes, and ratings required.

C. NEC Compliance: Comply with NEC requirements as applicable to construction, installation and color coding of electrical conductors.

D. UL Compliance: Provide wiring and connector products which are UL listed and/or labeled. Comply with UL Std. 486A.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver conductors properly packaged in factory-fabricated type containers, or wound on NEMA-specified type conductor reels.

B. Store conductors in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.

C. Handle conductors carefully to avoid abrading, puncturing and tearing conductor insulation. Ensure that dielectric resistance integrity of conductor is maintained.

1.7 COORDINATION

A. Coordinate layout and installation of materials specified in this section with other installations.

B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Engineer.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (for each type of conductor):

1. American Bare Conductor Incorporated
2. Cerro Wire LLC
3. Encore Wire Corporation.
4. General Cable Technologies Corporation.
5. The Okonite Company
6. Service Wire Company
7. Southwire Incorporated.
8. United Copper Industries

B. General: Provide electrical conductors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, for a complete installation, and for application indicated.

C. Building Conductors: Provide factory-fabricated conductors of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper conductor selection as determined by Contractor to comply with project's installation requirements, NEC and NEMA standards.

D. Conductors No. 10 and smaller may be solid or stranded and conductors larger than No. 10 shall be stranded.

E. Conductors manufactured more than twelve months prior to date of delivery to site shall not be used.

F. Conductor Insulation:

1. Type THHN/THWN-2 Comply with NEMA WC 70/ICEA S-95-658 and UL83.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amp, Inc.
2. Burndy Corp.
3. Ideal Industries, Inc.
4. IISCO
5. O-Z/Gedney; a brand of the Emerson Industrial Automation Group.
6. 3M; Electrical Products.
7. Thomas & Betts Corp., a member off the ABB Group

B. General: Provide UL type factory-fabricated metal connectors and splices of size, ampacity rating, materials, types, and classes for applications and for services indicated.

C. General: Provide electrical connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, for a complete installation, and for application indicated.

D. Where not indicated, provide proper selection as determined by the Installer to comply with the project's installation requirements, and with NEC and NEMA standards.

E. Provide electrical connectors and terminals which mate and match, including sizes and ratings, with equipment terminals and are recommended by equipment manufacturer for intended applications.

F. Provide electrical insulating tape, wirenuts and ties as recommended for use by accessories manufacturers for type services indicated.

G. Select from the following, those types, classes, kinds and styles of connectors to fulfill project requirements:

1. Type: Pressure, threaded.
2. Class: Insulated.
3. Kind: Copper (for Cu to Cu connection).
4. Style: Tap, pigtail, wirenut, split bolt, T-connections.

H. Splices

1. Splices of #6 wire and higher shall be compression splices. Crimp splices are unacceptable. Use of proper hydraulic tool and dies are required. Manufacture:

   a. Burndy Hylink Long barrel splice with proper hydraulic tool and dies
   b. Equal meeting performance standard of specified manufacture

PART 3 - EXECUTION

3.1 GENERAL

A. Install conductors and wiring connectors as indicated, in compliance with applicable requirements of NEC, NEMA, UL, and NECA's "Standard of Installation", with equipment manufacturer's written instructions and in accordance with recognized industry practices.

B. Coordinate conductor installation work including electrical raceway and equipment installation work, as necessary to properly interface installation of conductors with other work.

C. This part of the specification indicates which wiring methods are permitted in different applications.

3.2 CONDUCTOR MATERIAL APPLICATIONS

A. Provide copper conductors with conductivity of not less than 98% at 68°F.

3.3 CONDUCTOR INSULATION APPLICATIONS

A. Select from the following UL types, those conductors with construction features which fulfill project requirements:

1. Type THHN/THWN-2: For all locations except as noted; maximum operating temperature 90°C (194°F). Insulation, flame-retardant, moisture and heat-resistant, thermoplastic; outer covering, nylon jacket; conductor, annealed copper.

3.4 INSTALLATION OF CONDUCTORS

A. All conductors shall be run in conduit.

B. Conceal conduit in finished walls, ceilings, and floors unless otherwise indicated.

C. All branch circuit wiring requires dedicated neutrals.

D. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values. Do not use pulling compound or lubricant on isolated power system branch circuits.

E. Use pulling means, including fish tape, rope, and basket-weave wire grips, that will not damage wiring or raceway.

F. Remove existing conductors from raceway before pulling in new conductors.

G. Use no conductor smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring (fire alarm).

H. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet, unless otherwise noted on the Drawings.

I. Use 10 AWG conductor for 20 ampere, 277 volt branch circuit home runs longer than 200 feet, unless otherwise noted on the Drawings.

J. Place an equal number of conductors for each phase of a circuit in same raceway, unless indicated otherwise on the Drawings.

K. Make conductor lengths for parallel circuits equal.

L. Pull conductors simultaneously where more than one is being installed in same raceway.

M. Conductors of different systems or branches of the electrical distribution shall not be routed to the same raceways or enclosures. Normal, critical, life safety, and equipment branches shall all be routed independent of each other.

N. Completely and thoroughly swab raceway system before installing conductors.

O. Neatly train and lace wiring inside boxes, equipment and panelboards.

P. All neutrals and ground wires in panels shall be labeled with numbered tape to indicate the circuits being served.

Q. Where conductors are routed through junction boxes (without splicing), maintain at least a 6” loop in each conductor.

R. Branch circuit wiring shall not loop through receptacle terminals, but shall be connected by means of conductor taps joined to branch circuit conductors. At end of run, branch circuit conductors may terminate on receptacle terminals.

S. Position all splices in pull boxes and junction boxes of adequate volume so they are accessible from the removable cover side of the box.

T. Conductors for signal systems shall be continuous and shall be terminated on terminal strips or terminate in a manner approved by the system's manufacturer.

U. All splices of feeder conductors must be approved in advance by the Engineer.

V. Panelboard feeders shall not be spliced under any circumstances. Carefully plan for continuous conductors between source and destination.

W. Install all Isolated Power wiring per NEC requirements. Each circuit shall be pulled in a separate conduit. No pulling compound shall be used.

3.5 CONNECTIONS

A. Splice only in accessible junction boxes.

B. Keep conductor splices to minimum.

C. Splices, taps and attachments of fittings and lugs shall be electrically and mechanically secure. Connectors and lugs shall be correct size for conductors jointed.

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

E. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.

F. Prepare conductors, by cutting and stripping jacket, and insulation properly to ensure uniform and neat appearance where conductors are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Also avoid "ringing" copper conductors while skinning conductor.

G. Trim conductors as short as practicable and arrange routing to facilitate inspection, testing and maintenance.

H. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque-tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A-486B.

I. Install splices and taps which possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

J. Use splice and tap connectors which are compatible with conductor material.

K. Solid conductors, namely those sized No. 10, No. 12 AWG copper, and smaller, shall be spliced by using Ideal "Wing-Nuts," 3M Co.'s "Scotchlox" or T&B "Piggy" conductors in junction boxes and light fixtures, except recessed fixtures as noted below.

1. "Sta-Kon" or other permanent type crimp connectors shall not be used.
2. Contractor shall use Ideal "Wing-Nuts" for splicing recessed lighting fixture leads to branch circuit conductors.

L. Stranded conductors, namely No. 8 AWG and larger, shall be spliced by UL listed Hypress compression splices. Insulate splices with 3M Company shrinkable tubing. Solderless mechanical connectors, for splices and tape provided with UL listed insulating covers, may be used instead of mechanical connectors plus tape. Crimp type barrel splices are not permitted.

M. Conductors, in all cases, shall be continuous from outlet to outlet, and no splicing shall be made except within outlet or junction boxes, troughs, and gutters.

N. Connectors for conductors No. 6 through No. 1/0 AWG shall be copper, bolted compression. Connectors for conductors No. 2/0 AWG and larger shall be bolted compression.

O. Taping of joints shall be made using special oil resistant vinyl plastic tape; UL listed, rated 105°C, Scotch Electrical Tape No. 33+ or reviewed equal.

P. Thoroughly clean conductors before installing lugs and connectors.

Q. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

R. Terminate spare conductors with electrical tape.

S. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

T. Ensure that direction of rotation of each motor fulfills requirements.

3.6 IDENTIFICATION - COLOR CODING AND MARKING:

A. All conductors shall be color-coded in accordance with the following table. The only exception will be when directed in writing by either the Owner, the A/E, or a code enforcement authority to use a different code-compliant color scheme. **Conductors in new construction not meeting these requirements shall be replaced (IMPORTANT:** Coordinate phase colors with Owner before proceeding with work. Get signed receipt on agreed upon color code, present to Engineer before pulling conductor):

B.

Conductor	Under 250V	250V and higher
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral (grounded)	White	Natural Gray
Ground (grounding)	Green	Green

C. Phase conductors sized #8 AWG and smaller shall be provided with the proper insulation color in manufacture. Phase conductors sized larger than #8 AWG may be identified with properly colored electrical tape.

D. Grounded or grounding conductors sized #6 AWG and smaller shall be provided with the proper insulation color in manufacture. Grounded or grounding conductors sized # 4 AWG and larger may be identified with properly colored electrical tape.

E. Neutral conductors shall have stripe or marking when required by NEC 200-6(d).

F. All conductors, including neutrals, passing through accessible boxes shall be identified by wrap-around self-adhesive markers. Markers shall be of type manufactured for this use. Markers shall be either pre-numbered or write-on types with clear plastic cover. Numbering shall indicate circuit designation or conductor designation.

G. All conductors being utilized for switch legs or travelers that pass through accessible boxes shall be identified by wrap-around self-adhesive markers. Markers shall be of type manufactured for this use. Markers shall be write-on types with clear plastic cover. Numbering shall indicate circuit designation with an “S” for switch leg or a “T” for traveler designation.

3.7 VERTICAL RISERS

A. Provide vertical riser supports per article 300.19 in NEC, NFPA70. Conductor supports shall be OZ Gedney type S or approved equal and shall be located in accessible pullboxes or cabinets of adequate size. Provide adequate structural connection of conductor supports to pullbox or cabinet.

3.8 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.9 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.10 FIELD QUALITY CONTROL

A. Feeders and branch circuits AWG # 4 and larger shall have their insulation tested after installation and before connection to utilization devices such as fixtures, motors, or appliances.

B. The Contractor shall furnish the instruments, materials, and labor for these tests.

C. Follow all recommended safety procedures and standards for electrical conductor testing.

D. Perform tests and inspections and prepare written test reports for each circuit. Provide a complete list of feeders arranged starting from the largest conductor size to the smallest. Provide feeder or circuit name and source and load name and readings at 30 seconds and 60 seconds and any times after 60 seconds that may be required for the reading to become constant.

E. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests: Inspect physical condition.
2. Uniform resistance test of parallel conductors.
3. Electrical tests:
   a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.
   b. Applied voltage shall be 500 V DC for 300 V rated conductors, and 1000 V DC for 600 V rated conductors. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated conductors and 100 megohms for 600 V rated conductors.

F. Discharge conductors properly after testing.

G. Conductors will be considered defective if they do not pass tests and inspections. Defective conductors shall be replaced at contractor’s expense.

END OF SECTION 16120

SECTION 16130 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.
7. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. GRC or RSC or RMC: Galvanized rigid metal conduit.

B. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

C. IMC: Intermediate metal conduit.

D. EMT: Electrical metallic tubing.

E. FMC: Flexible metal conduit.

F. LFMC: Liquid tight flexible metal conduit.

G. PVC: Polyvinyl Chloride.

1.4 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

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

1. Allied Tube & Conduit.
2. Anamet Electrical, Inc.
3. O-Z/Gedney.
4. Picoma Industries.
5. Republic Conduit.
6. Robroy Industries.
7. Southwire Company.
8. Thomas & Betts Corporation.
9. Western Tube and Conduit Corporation.
10. Wheatland Tube Company.
11. Polywater Duct Sealant.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. All locknuts and fittings shall be UL Listed 514B.

D. GRC: Comply with ANSI C80.1 and UL 6.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch (1 mm), minimum.

G. EMT: Comply with ANSI C80.3 and UL 797. If designated within the Construction Documents EMT conduit shall be manufactured in colors to match the noted requirements.

H. FMC: Comply with UL 1; zinc-coated steel. All FMC and fittings shall be UL listed as suitable for grounding.

I. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360 and shall be UL listed as suitable for grounding.

J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:
   a. Material: Steel
   b. Type: compression (raintight) with insulated throats.
3. Expansion Fittings: Steel, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
5. All fittings shall be listed as grounding type.

K. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

L. Quick-Setting Two-Part, Foam-Base Duct-Sealing System for sealing conduits.

1. Two part high expansion duct and conduit sealant. Sealant shall expand and harden to a “closed cell” rigid structure. Sealant shall be permanent but removable and completely seal raceway with conductors installed against passage of liquids, gasses or rodents. Product shall be UL listed and have class HFB fire retardant rating.

2.2 NONMETALLIC CONDUITS AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.
3. Arnco Corporation.
4. CANTEX Inc.
5. CertainTeed Corporation.
6. Condux International, Inc.
7. Electri-Flex Company.
8. Kraloy.
9. Lamson & Sessions.
10. Niedax Inc.
11. RACO; Hubbell.
12. Thomas & Betts Corporation.

B. Listing and Labeling: Nonmetallic conduits and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS, WALL DUCTS, FLOOR DUCTS AND AUXILIARY GUTTERS

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

1. Cooper B-Line, Inc.
2. Hoffman.
3. Mono-Systems, Inc.
4. Hubbell, Inc
5. Legrand

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 indoor, Type 3R outdoor, unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

F. Wireway shall be listed as a grounding path and meet the requirements of NEC 250.118 (13) or (14)

2.4 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface raceways shall be listed as a grounding path and meet the requirements of NEC 250.118 (14).

C. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Mono-Systems, Inc.
   b. Panduit Corp.
   c. Wiremold / Legrand.
   d. Hubbell, Inc.

D. Tele-Power Poles:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Mono-Systems, Inc.
   b. Panduit Corp.
   c. Wiremold / Legrand.
   d. Hubbell, Inc.

2. Material: Galvanized steel with ivory baked-enamel finish
3. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

2.5 BOXES, ENCLOSURES, AND CABINETS

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

1. Adalet.
2. Crouse-Hinds, Eaton Corporation
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. FSR Inc.
6. Hoffman; a Pentair Brand.
7. Hubbell Incorporated.

8. Kraloy.
9. Milbank Manufacturing Co.
10. Mono-Systems, Inc.
11. O-Z/Gedney.
12. RACO; Hubbell.
13. Robroy Industries.
14. Spring City Electrical Manufacturing Company.
15. Stahlin Non-Metallic Enclosures.
16. Thomas & Betts Corporation.
17. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover. All outdoor covers shall be continuously weather proof type.

E. Metal Floor Boxes:

1. Material: Cast metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb. (23 kg) shall be listed and marked for the maximum allowable weight.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

J. Device, Outlet, Data/Comm and junction box minimum Box Dimensions: 4 inches square by 2-1/8 inches deep.

K. Gangable boxes are prohibited.

L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 indoor and Type 3R outdoor with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

M. Cabinets:

1. NEMA 250, Type 1 indoor and Type 3R outdoor galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. **Indoors**: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC or IMC. Raceway locations include the following:
   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   c. Mechanical rooms.
   d. Gymnasiums.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. All feeders over 600 volts: GRC or IMC.
6. All power and/or control/low voltage conduits to and between all radiology equipment, and conduit to and in all patient care areas shall be EMT or GRC. Conduit installed underground below the building shall be PVC-coated rigid steel conduit.
7. All branch circuit conduit shall be EMT or GRC. Branch circuit conduit that is run under the building slab shall be PVC-coated rigid steel conduit.
8. Connection to Pumps, Generators, Daytanks: LFMC.
9. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC.
10. Damp or Wet Locations: GRC or IMC.
11. Conduit installed within 1 ½” of metal corrugated sheet roof decking shall be IMC or GRC.
12. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 in institutional and commercial kitchens and damp or wet locations.
13. All underslab conduit to healthcare radiology equipment (including, but not limited to all X-Ray equipment, Linear Accelerators, PET machines, CT machines, MRI’s, etc.): PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

B. Minimum Raceway Size: 3/4-inch trade size. 1/2” minimum FMC less than 6 foot long to light fixtures.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Install nonferrous conduit or tubing for circuits operating above 60 Hz. or inside a MRI enclosure. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

3.2 RACEWAY AND BOX IDENTIFICATION

A. Raceway system and box identification shall be per the “Electrical Identification” section of these specifications.

3.3 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Support raceways independently of other system components.

D. Raceways above ceilings shall not be supported by walls or wall studs. All raceways above ceilings shall be suspended from the structure above either individually or on conduit racks.

E. All conduit hangers shall be minimum ¼” diameter all thread rod with lock nuts and washers on each side of each fitting.

F. Complete raceway installation before starting conductor installation.

G. Use long radius bends where possible on all medium voltage or shielded cable runs.

H. Arrange stub-ups so curved portions of bends are not visible above finished slab.

I. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

J. All metallic raceways shall be of ¾” minimum size.

K. All non-metallic raceways shall be of 1” minimum size.

L. Individual flexible connections to light fixtures shall be no less than 1/2”” in size and no longer than 6 feet. Fittings shall be listed.

M. In no case shall any conduit be filled to over 40 percent of its cross-sectional area.

N. Fasten conduit securely to outlets, junctions and pullboxes to ensure firm electrical contact.

O. Support conduit within 12 inches of box or enclosure to which attached. All supports shall be UL listed and specifically made for the purpose.

P. Avoid condensation pockets in installations. Keep conduit, fittings, and boxes free from foreign matter, before, during and after installation.

Q. Not more than one (1) exposed conduit shall be run down to an exposed wall switch or outlet box.

R. Use thruwall sealing fittings where conduits enter buildings or vaults below finished grade. Fill annular opening around pipe with "link-seal" system for a water tight seal. All conduit passing through walls shall be sleeved with Schedule 40 black steel pipe.

S. Install Quick-Setting Two-Part, Foam-Base Duct-Sealing System inside all conduits entering or leaving the building at the building perimeter or closed junction point. Install for both underground and overhead conduits penetrating the building. Sealing system shall prevent the entrance of gases, dampness, or rodents. Cured foam shall be semi-permanent and be able to be removed.

T. Support conduit risers exposed in wire shafts at each floor level with approved U-clamp hangers.

U. Install empty conduit for future use as indicated on the drawings. Conduit shall be complete with pullwire or rope, junction and outlet boxes.

V. Do not install conduit laid across roof deck, run conduit horizontally below roof deck and stub up where needed to feed equipment. Conduit may be run on raised roof racks constructed of galvanized steel or on mechanical equipment racks.

W. Conduit shall not be supported from metal roof deck or from ceiling support wires.

X. Provide pitchpocket where conduit penetrates roof.

Y. All conduits shall be installed as high as possible in the ceiling cavity. Coordinate all conduit installation with ductwork, sprinkler, and/or mechanical piping.

Z. Above ceiling conduits shall be supported from structure above and shall not be run on or supported by wall studs or walls above the ceiling.

AA. Install miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split coupling, and plugs that have been specifically designed and manufactured for their particular application.

BB. Set conduit and boxes for connection to units only after receiving review of dimensions and after checking location with other trades and architectural elevations.

CC. Conduits shall not cross pipe shafts or ventilating duct openings.

DD. Support riser conduit at each floor level with clamp hangers.

EE. All conduits shall be consolidated and run in conduit racks as much as possible. All racks shall be provided with a capacity for 50% future conduits. Racks shall be suspended from the structure above.

FF. Arrange all conduits to maintain headroom and present a neat appearance.

GG. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines. Conduit not installed parallel or perpendicular to building lines shall be removed and properly reinstalled.

HH. Raceways shall not be installed in or under concrete floor slabs without the prior approval of the A/E.

II. Raceways Embedded in Slabs:

1. Conduit **shall not** be installed in slabs.

JJ. Raceways below slabs (where indicated):

1. Conduit run below slab shall be a minimum of 6” below the slab.
2. PVC conduit shall be changed over to GRC 18” minimum before penetrating and exiting the slab and shall include the last elbow.

KK. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

LL. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

MM. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

NN. Raceway Terminations: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

OO. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

PP. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

QQ. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

RR. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

SS. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

TT. Surface Raceways:

1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

UU. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

VV. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

WW. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

XX. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
   d. Attics: 135 deg F (75 deg C) temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or seismic expansion joints. Do not use flexible metal conduit, use expansion joints made for the purpose that include a ground strap.

5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

YY. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed luminaires**,** equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

ZZ. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

AAA. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

BBB. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

CCC. Locate boxes so that cover or plate will not span different building finishes.

DDD. Support all wall boxes by spanning two framing members on mounting on brackets specifically designed for the purpose. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

EEE. Set metal floor boxes level and flush with finished floor surface.

FFF. All screws into any junction box shall be installed into a pre-drilled and pre-tapped hole and the screws shall not be self-tapping. The screws shall be flat or rounded at the end of the thread opposite the head of the screw so as to avoid cutting or puncturing the cable insulation. Screws shall be installed in locations where they will not contact the conductors.

3.4 PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies and all foundation or footing penetrations. Sleeves shall be a minimum of at least ¾” around outside diameter of conduits over 2”.

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. All firestopping assemblies shall be UL listed for the exact application. Wall or floor preparation for the firestopping method shall exactly meet the UL listing criteria.

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 16130

SECTION 16140 - WIRING DEVICES

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. The extent of wiring device work is indicated by the Drawings. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy.

B. Types of electrical wiring devices in this section include the following:

1. Connector bodies.
2. Receptacles.
3. Ground-fault circuit interrupters.
4. Twist-locking receptacles.
5. Receptacles with integral surge-suppression units.
6. Weather-resistant receptacles.
7. Switches.
8. Wallplates.
9. Wall-dimmers.
10. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.3 ACTION SUBMITTALS

A. General: Submit each item in this section in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

1.4 QUALITY ASSSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of electrical wiring devices, of types, sizes, and ratings required.

B. NEC Compliance: Comply with NEC as applicable to installation and wiring of electrical wiring devices.

C. UL Compliance: Comply with applicable requirements of UL 20, 486A, 498 and 943 pertaining to installation of wiring devices. Provide wiring devices which are UL listed and/or labeled.

D. NEMA Compliance: Comply with applicable portions of NEMA Stds Pub/No. WD 1, “General Color Requirements for Wiring Devices” "General-Purpose Wiring Devices," WD 2, "Semiconductor Dimmers for Incandescent Lamps," WD3, "Alternating-Current general use Snap Switches," WD 5, "Specific-Purpose Wiring Devices, WD 6, “Wiring Devices—Dimensional Specifications”.

1.5 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations and ratings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Hubbell Incorporated.
2. Pass & Seymour/Legrand.
3. Arrow-Hart, Division of Eaton Corporation
4. Lutron Electronics Co., Inc.

B. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. General: Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and which comply with NEMA Stds Pub/No. WD 1.

B. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

D. Install wiring devices after wiring work is completed.

E. Device colors shall be as follows:

1. Normal power device receptacles, dimmers and light switches – ivory.
2. Critical power device receptacles, dimmers and light switches – red.

F. Receptacles, Straight Blade

1. All receptacles shall be heavy duty, hospital grade and listed and labeled for such use.
2. Provide tamper resistant receptacles in all designated general care pediatric locations per NFPA 70-517.18. Provide tamper resistant receptacles all waiting areas and in any other locations as shown the drawings.
3. All receptacles installed outdoors and in other wet or damp locations shall be “weather-resistant” type and listed and labeled for such use.

   a. All outdoor receptacles shall be installed in “weather resistant in use” covers.
   b. All indoor receptacles shall be installed using wet rated covers.

4. Provide hospital grade duplex receptacles as required above, 2-pole, 3-wire, grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke unless noted otherwise, 20-amperes, 125-volts, with metal plaster ears; design for side wiring with spring loaded, screw activated pressure plate, with NEMA configuration 5-20R unless otherwise indicated. Provide tamper resistant hospital grade as required above.

5. Receptacles requiring a current or voltage rating or configuration different from convenience receptacles shall be as indicated on the Drawings.
6. Provide other receptacles with quality, material and workmanship at least equal to that specified for duplex convenience receptacles.
7. Auto-ground clips shall not be acceptable for receptacle grounding.

G. Receptacles, Twist Lock

1. Twist lock receptacles shall not be installed in patient or visitor occupied areas.
2. All twist lock receptacles shall be single receptacle, grounding type, and listed and labeled for such use.
3. All twist lock receptacles installed outdoors and in other wet or damp locations shall be “weather-resistant” type and listed and labeled for such use.
4. Provide twist lock receptacles as required above, 2-pole, 3-wire, grounding, with green equipment ground screw, ground terminals and poles internally connected to mounting yoke unless noted otherwise, 20-amperes, 125-volts, with metal plaster ears; design for side wiring with wire clamp, with NEMA configuration L5-20R unless otherwise indicated.
5. Twist lock receptacles requiring a current or voltage rating or configuration different from above shall be as indicated on the Drawings.
6. Provide other receptacles with quality, material and workmanship at least equal to that specified for the above twist lock receptacles.
7. Auto-ground clips shall not be acceptable for receptacle grounding.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Hospital-Grade, Duplex Convenience Receptacles: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

B. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.

C. Tamper-Resistant Hospital-Grade Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

1. Description: Label shall comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.
2. Tamper-Resistant receptacles shall be hospital grade, meeting the requirements and description with grounding as described above.

2.4 GFCI RECEPTACLES

A. General Description:

1. All devices shall meet the 2015 revisions to the UL 943.
2. Straight blade, feed -through type.
3. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 498 Supplement sd, UL 943 Class A, and FS W-C-596.
4. Configuration: Duplex, NEMA 5-20R.
5. Trip Current: 5 plus or minus 1 milliampere.
6. Trip Speed: 0.025 second maximum.
7. GFCI receptacle shall be hospital grade.
8. Feed-thru, capable of protecting connected downstream receptacle on a single current, front-accessible test, and reset pushbuttons.
9. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

10. Receptacles requiring a current or voltage rating or configuration different from duplex GFCI convenience receptacles shall be as indicated on the Drawings.
11. Provide other receptacles with quality, material and workmanship at least equal to that specified for duplex GFCI convenience receptacles.

B. Hospital-Grade, Duplex GFCI Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596

C. Hospital Grade Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

1. Receptacles requiring a current or voltage rating or configuration different from tamper resistant GFCI convenience receptacles shall be as indicated on the Drawings.
2. Provide other receptacles with quality, material and workmanship at least equal to that specified for tamper resistant GFCI convenience receptacles.

D. Required Accessory

1. 2-3/4” deep outlet box without an adapter.

2.5 SINGLE RECEPTACLES

A. Provide single straight-blade receptacles, ratings and NEMA configurations as listed on drawings, grounding type, with green hexagonal equipment ground screw, ground terminals and poles internally connected mounting yoke, with metal plaster ears; design for back wiring with spring loaded, screw activated pressure plate.

2.6 TVSS RECEPTACLES

A. General Description: Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 1449, and FS W-C-596, with integral TVSS in line to ground, line to neutral, and neutral to ground.

1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
2. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Comply with NFPA 70.

B. Hospital-Grade, Duplex Convenience Receptacles: Comply with UL 498 Supplement sd.

1. Description: Straight blade, 125 V, 20 A; NEMA WD 6 Configuration 5-20R.

2.7 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.

B. Isolated-Ground, Single Convenience Receptacles, 125 V, 20 A:

1. Description:

a. Comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.

b. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.8 SPECIALTY OR DEDICATED RECEPTACLES

A. Provide as specified on drawings or in equipment literature.

2.9 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Provide totally enclosed, 20 Ampere, 120/277 Volt, quiet AC general-use snap switches.

C. Switches shall be single pole, double pole, three-way, four-way, locking or with pilot light as indicated on the drawings.

D. Switches shall be specification grade.

2.10 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.

C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.

1. 600 W; dimmers shall require no derating when ganged with other devices.

D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

E. LED Lamp Dimmer Switches: Modular; Fully compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 5 percent of full brightness or to a level indicated.

2.11 WALL PLATES

A. All wiring devices shall be provided with standard size one-piece cover plates of suitable configuration for the number and type of devices to be covered

B. All cover plates shall be stainless steel except as specifically noted

C. Metallic cover plates shall be fabricated of corrosion-resistant #302 stainless steel, having a nominal thickness of .04", and a brushed or satin finish. Screws securing the plates shall have flush (when installed) heads with finish to match plates. Metallic cover plates shall meet all requirements of the National Electrical Code and Federal Specifications

D. Dry Location wall plates: Provide wall plates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as indicated. Select plates which mate and match wiring devices to which attached.

1. Plate-Securing Screws: Screws securing the plates shall have flush (when installed) heads with finish to match plates.
2. Cover plates shall be constructed of corrosion-resistant #302/304 stainless steel. The plates shall have a minimum nominal thickness of .032", and a brushed or satin finish. Stainless steel plates shall be shipped with a protective film.
3. Provide all wall receptacles with a Caddy No. RLC leveler and retainer.
4. All wall plates for devices in block walls shall be oversize plates.

E. Wet Location, Weatherproof Cover Plates for 15 or 20 amp receptacles: NEMA 250, complying with Type 3R “in use type”, die-cast aluminum, listed “extra-duty” with lockable cover. Cover shall be continuously waterproof with cable plugged in. Covers shall be Intermatic WP1250MVXD for vertical installations or WP1010HMXD for horizontal installation; or approved equal.

F. Damp Location, unless noted otherwise shall meet the requirements of wet location cover plates.

2.12 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service cast units suitable for wiring method used. Boxes shall maintain the 2 or 3 hour fire rating of the floor.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plates: Rectangular; solid brass with satin finish, unless specified as otherwise on drawings.

D. Power Receptacle: NEMA WD 6 Configuration 5-20R, color to match wall receptacles, unless otherwise indicated.

E. Voice and Data Communication Outlet: Blank cover with bushed cable opening.

2.13 PREFABRICATED MULTIOUTLET ASSEMBLIES

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

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Wiremold/Legrand.

B. Description:

1. Two-piece surface metal raceway, with factory-wired multioutlet harness.
2. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

C. Raceway Material: Metal, with manufacturer's standard finish.

D. Multioutlet Harness:

1. Receptacles: 20-A, 125-V, NEMA WD 6 Configuration 5-20R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.
2. Receptacle Spacing: 12 inches (300 mm) unless specified otherwise on drawings.

3. Wiring: No. 12 AWG solid, Type THHN copper, two circuit, connecting alternating receptacles unless specified otherwise on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wiring devices as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in accordance with recognized industry practices to fulfill project requirements.

1. Where adjacent to doors, coordinate with architectural drawings to ensure switches are installed on strike side of door.
2. Locate switches 48 inches (centerline) above finished floor elevation unless otherwise indicated. Group adjacent switches under single, multigang wall plates.
3. Long dimension of switches shall be vertical unless otherwise indicated or required.
4. Locate receptacles 18 inches (centerline) above finished floor elevation unless otherwise indicated.
5. Long dimension of receptacles shall be vertical unless otherwise indicated or required.

B. Location of special receptacles:

1. Provide GFCI receptacles within 6’0” of any sink and where shown on drawings.
2. Provide GFCI receptacles in any kitchen area and where shown on drawings.
3. Provide tamper resistant receptacles in all designated general care pediatric locations per NFPA 70-517.18. Provide tamper resistant receptacles in all waiting areas and in any other locations as shown the drawings.
4. Provide poke-through assemblies where floor mounted receptacles are call for on all above grade floor slabs.
5. Provide Cast floor boxes on all slabs on grade.

C. Coordination with Other Trades:

1. Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation of wiring devices with other work.
2. Refer to Architectural drawings for possible wall elevations showing exact location requirements of devices.
3. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
4. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
5. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
6. Install wiring devices after all wall preparation, including painting, is complete.
7. Review approved casework/millwork drawings prior to rough-in of devices in applicable areas. Coordinate receptacle, switch, and data outlets to be of uniform height over casework/millwork. In all cases, devices and covers shall clear backspashes by at least 2”

D. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails and shall be at least 6”.

E. Device Installation:

1. Replace all devices that have been in temporary use during construction or that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
10. Install a 120 Volt “weatherproof in use” cover for the duplex receptacle adjacent to each appliance mounted on the roof, which is capable of being serviced from the roof.
11. Install other devices as indicated on the Drawings. Check Architectural drawings for elevations that may show exact device locations.
12. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices.
    a. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B.
    b. Use properly scaled torque indicating hand tool.
13. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Receptacle Orientation:

1. Install receptacles with ground pin or neutral blade of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.

G. Protection of Wall Plates and Receptacles

1. Protect wiring devices and wallplates during construction.
2. Cover boxes during painting and drywall operations.
3. At time of Substantial Completion, replace those items which have been damaged or painted including those burned and scored by faulty plugs.

H. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with "Electrical Identification" specification section.

3.3 FIELD QUALITY CONTROL

A. Prior to energizing circuitry, test wiring for electrical continuity, and for short-circuits.

B. Subsequent to completion of installation of wiring devices, energize circuitry and demonstrate capability and compliance with requirements.

C. Test all wiring devices to demonstrate compliance with requirements.

D. Ensure proper polarity of connections is maintained.

E. Test GFCI operation with both local and remote fault simulations according to manufacturer’s written instructions.

F. Where possible, correct compliance with requirements.

G. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest.

H. Perform tests and inspections and prepare test reports.

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

I. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 114 to 126 V.
2. Ground Impedance: Comply with recommendations in NFPA 99.
3. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
4. Using the test plug, verify that the device and its outlet box are securely mounted.
5. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

J. Test straight-blade hospital-grade convenience outlets for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

K. Wiring device will be considered defective if it does not pass tests and inspections.

L. Prepare test and inspection reports.

3.4 GROUNDING

A. Provide equipment grounding connections for wiring devices including switches, unless otherwise indicated.

B. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

END OF SECTION 16140

SECTION 16145 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Division 16 Basic Electrical Materials and Methods sections apply to work of this section.

1.2 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Standalone daylight-harvesting switching controls.
4. Indoor occupancy sensors.
5. Lighting contactors.

B. Related Requirements:

1. "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

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

1. Cooper Industries, Inc.
2. Intermatic, Inc.

3. Invensys Controls.
4. Leviton Mfg. Company Inc.
5. NSi Industries LLC; TORK Products.
6. Tyco Electronics; ALR Brand.

B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: DPDT
3. Contact Rating: 30-A inductive or resistive, 240-V ac]
4. Programs: 2 channels; each channel is individually programmable with 40 on-off operations per week, plus four seasonal schedules that modify the basic program, and an annual holiday schedule that overrides the weekly operation on holidays.
5. Astronomic Time: All channels.

2.2 INDOOR OCCUPANCY SENSORS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

1. Bryant Electric; a Hubbell company.
2. Cooper Industries, Inc.
3. Hubbell Building Automation, Inc.
4. Leviton Mfg. Company Inc.
5. Lightolier Controls.
6. Acuity Lighting Controls.
7. Lutron Electronics Co., Inc.
8. NSi Industries LLC; TORK Products.
9. IR-TEC America, Inc.
10. Sensor Switch, Inc.
11. Square D; a brand of Schneider Electric.
12. Watt Stopper.

C. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:

   a. Sensor: Suitable for mounting in any position on a standard outlet box.

b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.

D. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection or high frequency doppler methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. (56 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
4. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
5. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. (186 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
6. Detection Coverage (Corridor): Detect occupancy within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling.

2.3 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Bryant Electric; a Hubbell company.
2. Cooper Industries, Inc.
3. Hubbell Building Automation, Inc.
4. Leviton Mfg. Company Inc.
5. Lightolier Controls.
6. Lithonia Lighting; Acuity Lighting Group, Inc.
7. Lutron Electronics Co., Inc.
8. NSi Industries LLC; TORK Products.
9. IR-TEC America, Inc.
10. Sensor Switch, Inc.
11. Square D; a brand of Schneider Electric.
12. Watt Stopper.

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).

3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.

C. Wall-Switch Sensor Tag WS1:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft. (84 sq. m) .
2. Sensing Technology: Dual technology - PIR and ultrasonic.
3. Switch Type: SP, field selectable automatic "on," or manual "on" automatic "off."
4. Voltage: Match the circuit voltage type.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc (108 to 1600 lux). The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.

2.4 LIGHTING CONTACTORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Allen-Bradley/Rockwell Automation.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution; Total Lighting Control.
3. Square D; a brand of Schneider Electric.

B. Description: Electrically operated and electrically held, combination-type lighting contactors with fusible switch, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices, matching the NEMA type specified for the enclosure.

2.5 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in "Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in "Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller thanNo. 14 AWG. Comply with requirements in "Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 CONTACTOR INSTALLATION

A. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

A. Wiring Method: Comply with "Conductors and Cables." Minimum conduit size is 3/4 inch (19 mm).

B. Provide all control wiring as required by the device manufacturer for complete and proper operation of the device.

C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring according to "Electrical Identification."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.

END OF SECTION 16145

SECTION 16452 - GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Division 16 Basic Materials and Methods sections apply to work of this section.

C. Requirements of this section apply to electrical grounding and bonding work specified elsewhere in these specifications.

D. Related work specified elsewhere includes:

1.2 SUMMARY

A. Extent of electrical grounding and bonding work is indicated by the Drawings and Schedules and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.

B. Type of electrical grounding and bonding work specified in this section includes the following:

1. Solidly grounded.

C. Applications of electrical grounding and bonding work in this section includes the following:

1. Electrical power systems.
2. Grounding rods.
3. Separately derived systems.
4. Raceways.
5. Enclosures.
6. Equipment.
7. Transformers.
8. Panelboards.
9. Service Equipment.
10. Area Lighting Fixtures.

D. Refer to other Division 16 sections for wires/cables, electrical raceways, boxes and fittings, and wiring devices which are required in conjunction with electrical grounding and bonding work.

1.3 SUBMITTALS

A. Submit each item in this section according to the condition of the contract and Division 1 specifications sections.

B. Product Data: Submit manufacturer's data on grounding systems, grounding and bonding products and associated accessories.

C. Qualification Data: For qualified testing agency and testing agency's field supervisor.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Install grounding and bonding products of firms regularly engaged in the manufacture of these materials, including stranded cable, grounding rods, and bonding jumpers.

B. Electrical Code Compliance: Comply with the applicable State electrical code requirements of the authority having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.

C. UL Compliance: Comply with applicable requirements of UL Standards No.'s 467, "Electrical Grounding and Bonding Equipment," and 869, "Electrical Service Equipment," pertaining to grounding and bonding of systems, circuits and equipment. In addition, comply with UL Standard 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide grounding and bonding products which are UL listed and/or labeled for their intended usage.

D. NFPA Compliance: Comply with applicable requirements of NFPA 99, "Health Care Facilities" and NFPA 101, "Life Safety Code."

E. IEEE Compliance: Comply with applicable requirements of IEEE Standards 142 and 241 pertaining to electrical grounding.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering grounding products which may be incorporated in the work include, but are not limited to, the following:

1. B-Line Systems, Inc.
2. Burndy Corporation.
3. Crouse-Hinds Div.
4. Cooper Industries.
5. Electrical Components Div.
6. General Electric Supply Co.
7. Gould Inc.
8. Ideal Industries, Inc.
9. Thomas & Betts Corp.
10. ERICO International Corporation.

2.2 MATERIALS AND PRODUCTS

A. General: Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials, including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding rods, bonding jumpers, service arresters, and additional accessories needed for a complete installation.

1. Where more than one type component product meets indicated requirements, selection is Contractor's option.

2. Where materials or components are not indicated, provide products which comply with NEC and UL requirements and with established industry standards for those applications indicated.

B. Conductors: Unless otherwise indicated, provide electrical grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC.

C. Bonding Connectors, Terminals and Clamps: Provide electrical bonding connectors, terminals, lugs and clamps as recommended by bonding connector, terminal and clamp manufacturers for indicated applications. For welded connections, use exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Grounding Rods: Ground rods for artificial grounding electrodes shall be of the sectional driven type, round, cone-pointed, copper encased steel of not less than ¾ inch diameter. Minimum length shall be 10 feet. All connections below grade and in inaccessible locations shall be Thermite welded. Each rod shall be die stamped with identification of manufacturer and rod length. Rods shall be Copperweld or approved equal.

E. Electrical Grounding Connection Accessories: Provide electrical insulating tape, bonding straps, as recommended by accessories manufacturers for type service indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Designer in writing of conditions detrimental to proper completion of work.

B. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS

A. General: Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's instructions and applicable portions of NEC, NECA's "Standard of Installation," and in accordance with recognized industry practices to ensure that products comply with requirements.

B. Install grounding systems as designed and submit certified test report on grounding system.

C. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.

D. Ground each separately-derived system neutral to building steel. Repair fire-proofing material.

E. Connect together service entrance system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and cold water systems.

F. Provide ground clamps for grounding conductors to underground grounding rods.

G. Provide a separate, insulated equipment grounding conductor from each device to ground buses in panelboards. Terminate each end on a grounding lug, bus, or insulated grounding bushing.

H. Provide grounding system per the Drawings and Article 250 of the NEC. Provide green equipment grounding conductor for all electrical raceways.

I. Connect grounding electrode conductors to building steel using a suitable grounding clamp, lightning protection ground system and 2-3/4" x 10'-0" copper clad steel ground rods driven not less than six feet apart.

J. Use minimum #2 AWG copper conductor for communications service grounding conductor. Leave 10 feet of slack conductor at terminal board.

K. Provide insulated grounding bushings on all service entrance conduit terminations, feeder conduits in panelboards, junction boxes, transformers, etc. Bond together with equipment grounding conductor. Double locknuts shall be provided on all heavywall conduits

L. Connect grounding electrode conductors to 1-inch diameter, or greater, metallic cold water pipe using a suitably sized ground clamp.

M. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.

N. Apply corrosion-resistant finish to field connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed, which are subjected to corrosive action.

O. Provide clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity.

P. Provide a No. 12 THHN-THWN or THW green grounding jumper from the ground terminal of each receptacle and switch to a hex head sheet metal screw on the outlet box. Install a ground wire with all branch circuit lighting and power circuits; with all feeders to panels; and with circuits to all owner or sub-contractor furnished equipment and as indicated on the drawings.

Q. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

R. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least 6’ from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

S. The equipment grounding terminal busses of the normal and essential branch panelboards serving the same individual patient vicinity shall be bonded together with an insulated continuous copper conductor not smaller than #10 AWG in ¾" conduit.

T. Grounding type receptacles shall be grounded with an equipment grounding conductor, sized per NEC, but not smaller than #12 AWG, routed with the branch circuit and connected to the equipment ground bus in the branch circuit panelboard. This equipment ground conductor shall also be bonded to the outlet box in which the receptacle is mounted. All plugstrips and metallic surface raceway shall contain a green insulated ground conductor from supply panel ground bus connected to grounding screw on each receptacle in strip and to strip channel. Conductor shall be continuous.

U. All new and removed/reinstalled lighting fixtures in building interior and exterior fixtures shall be provided with a green grounding conductor solidly connected to unit. Individual fixture grounds shall be with lug to fixture body, generally located at point of electrical connection to the fixture unit.

V. Grounding of transformers and enclosures of 120/208 V and 277/480 V "separately derived systems" shall be to the nearest grounding electrode, grounded structural steel (when accessible), effectively grounded metal water pipe, or other approved electrodes when the former are not available. Neutral and ground conductors on the secondary side of the transformer shall be bonded at the transformer only, not at the overcurrent protection point. Provide bond jumper sized per NEC Table 250-66.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
   a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.
4. Coordinate subparagraph below with "Informational Submittals" Article; revise to suit Project.
5. Prepare dimensioned Drawings locating ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

6. In all patient care areas as defined by NEC and NFPA 99 provide a report by an independent testing agency that grounding is in compliance. The grounding system shall be tested and documented in accordance with NFPA 99. Include both voltage measurements and impedance measurements. Testing method of this compliance shall be in compliance with the authority having jurisdiction.

B. Grounding system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).

E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 16452

SECTION 16511 - INTERIOR LIGHTING

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 work of this Section.

B. Division 16 Basic Electrical Materials and Methods sections apply to work specified in this section.

1.2 SUMMARY

A. Extent, location, and details of interior lighting fixture work are indicated on drawings and in schedules.

B. Section Includes:

1. Interior lighting fixtures
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. LED: Light-emitting diode

D. LER: Luminaire efficacy rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 ACTION SUBMITTALS

A. General: Submit each item in this section in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Emergency lighting units including battery and charger.
3. Energy-efficiency data.
4. Life, output (lumens, CCT, and CRI)

5. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. LED fixtures shall be tested per IES LM-79 and IES LM-80.

    a. Certified fixtures, as noted on schedule, by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
    b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

C. Shop Drawings: For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

D. Provide samples of fixtures to the designer as requested.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of interior lighting fixtures of sizes, types and ratings required, whose products are UL listed and/or labeled.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

E. Electrical Code Compliance: Comply with applicable State code requirements of the authority having jurisdiction.

F. UL Compliance: Comply with UL standards, including UL 486A and B, pertaining to interior lighting fixtures. Provide interior lighting fixtures and components which are UL listed and labeled.

G. Each LED fixture type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.8 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

B. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of interior lighting fixtures with other work.

C. Sequence interior lighting installation with other work to minimize possibility of damage and soiling during remainder of construction.

1.9 WARRANTY

A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.

B. Special Warranty for LED fixtures: LED fixtures shall have a five year full replacement warranty.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver interior lighting fixtures in factory-fabricated containers or wrappings, which properly protect fixtures from damage.

B. Store interior lighting fixtures in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.

C. Handle interior lighting fixtures carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated on Drawings. All fixtures of the same type shall be of one manufacturer.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. LED Fixtures: Comply with UL 1598 and UL 8750. Where LER is specified, test according to NEMA LE 6 as applicable.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Steel unless otherwise indicated. Components used in MRI Exam Room shall be of nonmagnetic materials. Form and support to prevent warping and sagging.

E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

F. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

   a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
   b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

G. Factory-Applied Labels: Comply with UL 1598. Labels shall be located where they will be readily visible to service personnel,

H. Electromagnetic-Interference Filters: Factory installed to suppress conducted electromagnetic interference as required by MIL-STD-461E. Fabricate lighting fixtures with one filter on each ballast indicated to require a filter.

I. Lighting Fixtures Recessed in Fire Rated Ceilings, and Plenum Spaces:

1. Fixture shall be constructed to provide continuous operation when installed in air plenums, or when surrounded with restrictive enclosures of fire-rated construction. See architectural ceiling schedule.
2. Where space above ceiling is used as an air plenum for return air ventilation arrangements, the fixture shall be factory wired in accordance with Article 300-22 of the NEC and U.L. approved for use in air plenums. Coordinate with Division 26 work.

J. LED fixtures shall have integral drivers.

K. LED drivers for fixtures indicated to be dimmed, step-dimmed or fully dimmed, shall have the LED drivers and the dimmers matched to provide the performance indicated on the drawings.

2.3 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction. Provide self-powered battery type or non-battery type as called for on the drawings.

B. Internally Lighted Signs:

1. LEDs, 50,000 hours minimum rated lamp life.

2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

   a. Battery: Sealed, maintenance-free, nickel-cadmium type.
   b. Charger: Fully automatic, solid-state type with sealed transfer relay.
   c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lighting unit from battery, and battery is automatically recharged and floated on charger.
   d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
   e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
   f. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.4 EMERGENCY LIGHTING UNITS

A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lighting unit from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
7. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.5 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

B. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

D. Rod Hangers: 1/4-inch (6.35-mm) minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

F. Factory mounting bars: Provide factory mounting bars for all recessed downlights installed in lay in ceilings that will support the fixture from the ceiling tee bars.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Install interior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements. Set level, plumb, and square with ceilings and walls unless otherwise indicated.

B. Lighting Fixtures Supports in Suspended Acoustical Ceiling: Use grid as a support element.

1. Install ceiling support system rods or wires, independent of the ceiling suspension system, for each fixture. Provide a fixture support wire from each corner of a lay-in fixture (1’x4’, 2’x2’ and 2’x4’) to the structural deck above.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch factory provided metal channels spanning and secured to ceiling tees. Provide a fixture support wire, independent of the ceiling system, from the fixture to the structural deck

C. Lighting Fixtures Support in Suspended Gypboard Ceiling: Use grid as a support element.

1. Fasten lighting fixtures to mounting flange at or near each fixture corner with screws and fixture clips that are UL listed for the application.

D. Recessed Downlight Supports in Suspended Acoustical Ceiling:

1. Each recessed down light shall be furnished with factory supplied T-bar hangers to attach the fixture to the ceiling grid system,
2. Provide a fixture support wire, independent of the ceiling system, from the fixture to the structural deck.

E. Fasten fixtures securely to indicated structural supports; and ensure that pendant fixtures are plumb and level. Provide individually mounted pendant fixtures longer than two (2') feet with twin stem hangers. Provide stem hanger with ball aligners and provisions for minimum one (1") inch vertical adjustment.

F. Mount continuous rows of fixtures with an additional stem hanger greater than number of fixtures in the row.

G. Connect wiring according to other Division 16 sections.

H. Provide fixtures and/or fixture outlet boxes with hangers to properly support fixture weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Engineer.

I. Install flush mounted fixtures properly to eliminate light leakage between fixture frame and finished surfaces.

J. Provide plaster frames for recessed fixtures installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.

K. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B, and the National Electrical Code.

L. Support surface mounted fixtures greater than two (2') feet in length at one other point in addition to the outlet box fixture stud.

M. Surface mounted fixtures shall be mounted using 1/4" threaded rod at each end and rods shall be attached to the building structure above the ceiling. Ceiling grid tees shall not be used for supporting surface mounted fixtures.

N. Do not use fixture as raceway. Provide factory mounting bars to suspend all recessed downlights installed in lay in ceilings that will support the fixture from the ceiling tee bars.

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in "Electrical Identification."

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

C. Replace defective fixtures and components and burned out LED lighting units for a period of one year following the Date of Substantial Completion.

D. At Date of Substantial Completion, replace LED lighting units in interior lighting fixtures which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Engineer.

3.4 GROUNDING

A. Provide equipment grounding connections for interior lighting fixtures as indicated and as specified in Grounding.

B. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

3.5 ADJUSTING AND CLEANING

A. Clean interior and exterior lighting fixtures of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses.

B. Protect installed fixtures from damage during remainder of construction period.

3.6 DEMONSTRATION

A. Upon completion of installation of interior lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements.

B. 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 16511