

PROJECT MANUAL FOR

**Security Improvements and
Door Replacements for**

**WARREN WILLIAMS
ELEMENTARY SCHOOL**

Lee County Schools

*901 Lawrence Street
Sanford, North Carolina 27330*

Hite associates

ARCHITECTURE / PLANNING / TECHNOLOGY

2600 Meridian Drive / Greenville, NC 27834 / tel 252.757.0333 / www.hiteassoc.com

December 2024

NOTICE TO BIDDERS

INSTRUCTIONS TO BIDDERS

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

FORM OF PROPOSAL

HUB INSTRUCTIONS AND FORMS FOR BIDS

FORM OF CONTRACT

DIVISION 1 - GENERAL REQUIREMENTS

- Section 01010 – General Conditions of the Contract
- 01012 – Supplementary Conditions
- 01040 - General Requirements & Construction Schedule
- 01055 - Alternates
- 01056 - Allowances
- 01068 - Index of Industry Standards Abbreviations

DIVISION 2 - SITE WORK

- Section 02070 – Selective Demolition
- 02110 - Site Clearing
- 02200 - Earthwork
- 02400 - Erosion Control
- 02480 - Landscape Work
- 02500 – Concrete Curb, Gutter, and Sidewalks
- 02736 – Storm Sewer System
- 02830 – Chain Link Fence and Gates

DIVISION 3 - CONCRETE

- Section 03100 - Concrete Formwork
- 03200 - Cast-In-Place Concrete
- 03250 - Concrete Finishes
- 03300 - Concrete Reinforcement

DIVISION 4 - MASONRY

- Section 04200 - Unit Masonry
- Brick Technical Notes 7B; Water Resistance – Construction and Workmanship

DIVISION 5 - METALS

- Section 05120 - Structural Steel
- 05400 – Cold-Formed Metal Stud Framing System
- 05500 - Metal Fabrications

DIVISION 6 - WOOD AND PLASTICS

- Section 06100 - Rough Carpentry

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section 07600 – Flashing and Sheet Metal
07900 - Joint Sealers

DIVISION 8 - DOORS AND WINDOWS

Section 08100 – Steel Doors and Frames
08200 – Wood Doors
08210 – FRP Doors and Frames
08410 – Aluminum Swing Entrances
08418 – Aluminum Storefront System
08423 – Fire-Rated Sliding Window
08700 - Finish Hardware – Including Security
08800 - Glass and Glazing
088853 – Security Glazing (for doors)
08870 – Security Glazing Films

DIVISION 9 - FINISHES

Section 09510 – Acoustical Ceilings
09900 – Painting

DIVISION 10 - SPECIALTIES

Section 10535 – Pre-Engineered Walkway Covers, Canopies, and Awnings

DIVISION 11 - EQUIPMENT

(NOT USED)

DIVISION 12 - FURNISHINGS

(NOT USED)

DIVISION 13 - SPECIAL CONSTRUCTION

(NOT USED)

DIVISION 14 - CONVEYING SYSTEMS

(NOT USED)

DIVISION 15 - MECHANICAL

(NOT USED)

DIVISION 15A - PLUMBING

(NOT USED)

DIVISION 15B - HEATING, VENTILATION, & AIR CONDITIONING

(NOT USED)

DIVISION 16 - ELECTRICAL

- Section 16000 - General Provision
- 16100 - Raceways and Conduits
- 16140 - Conductors and Wiring Devices
- 16400 - Service and Distribution
- 16500 - Lighting Systems
- 16700 - Security Systems
- 16900 - Tests and Project Close-Out

DIVISION 17 INTERGRATED COMMUNICATIONS

- Section 17000 - General Provisions
- 17100 - Intergrated Communication System
- 17200 - Horizontal Cabling
- 17250 - Backbone Cabling
- 17900 - Tests, Commissioning and Project Closeout

END OF TABLE OF CONTENTS

NOTICE TO BIDDERS

Sealed proposals from selected bidders will be received by Lee County Schools, at the Maintenance Office, 2000 Nash Street, Sanford, NC 27330. Single Prime Bids will be accepted up to 2:00 PM. on January 22, 2025, for the furnishing of labor, material and equipment entering into the construction of the SECURITY IMPROVEMENTS AND DOOR REPLACEMENTS FOR WARREN WILLIAMS ELEMENTARY SCHOOL. Bids shall be marked "SEALED BID", addressed to the attention of Chris McNeill, Lee County Schools, and shall include the Name, Address, and License Number of the Bidder, and the type proposal enclosed.

Bids will be received as follows:

1. Single Prime Contract (All Work)

Complete plans, specifications and contract documents are available on the Hite Associates website, www.hiteassoc.com ; and will be open for inspection in the office of the Architect, Hite Associates, 2600 Meridian Drive, Greenville, North Carolina, 27834, and; may be obtained by purchased by calling Speedyblue Reprographics at (252) 758-1616, print@speedyblue.com.

There will be a Pre-Bid Conference at Lee County Schools, at the Maintenance Office, 2000 Nash Street, Sanford, NC 27330 on January 8, 2025, at 11:00AM.

All Contractors are hereby notified that they must have proper license under the State laws governing their respective trades.

General Contractors are notified that Chapter 87, Article I, General Statutes of North Carolina, will be observed in receiving bids and awarding the General Contract. General Contractors submitting bids on this project must have proper license classification.

Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, of an amount equal to not less than five percent (5%) of the proposal, or in lieu thereof, a bidder may offer a bid bond of five percent (5%) of the bid executed by a surety company licensed under the laws of North Carolina to execute such bonds, conditioned that the surety will, upon demand forthwith make payment to the obligee upon said bond if the bidder fails to execute the contract in accordance with the bid bond. Said deposit shall be retained by the Owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten days after the award or to give satisfactory surety as required by law. In determining the value of the bid bond, additive or deductive alternates shall be considered as they are accepted by the Owner.

A Performance Bond and a Labor and Materials Payment Bond will be required for one hundred percent (100%) of the contract price.

NOTICE TO BIDDERS

Payment will be made on the basis of ninety-five percent (95%) of monthly estimates and final payment made upon completion and acceptance of work.

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of 60 days after the bid date.

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

SIGNED: Mr. Chris McNeill
Lee County Schools
Sanford, North Carolina

DESIGNER: HITE ASSOCIATES, P.C.
2600 Meridian Drive
Greenville, North Carolina 27834

GO TO NEXT PAGE



AIA® Document A701® – 2018

Instructions to Bidders

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

Warren Williams ES Security Improvements
Warren Williams Elementary School
901 Lawrence Street
Sanford, NC 27330

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

Lee County Schools
106 Gordon Street
Sanford, NC 27332

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

Hite Associates, P.C.
2600 Meridian Drive
Greenville, NC 27834
Telephone Number: 252-757-0333

TABLE OF ARTICLES

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

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

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

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

ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

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

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

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

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

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

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

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

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

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

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

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

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

§ 3.4 Addenda

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

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

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

§ 3.4.3 Addenda will be issued prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount

of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

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

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

§ 4.3 Submission of Bids

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

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

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

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

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

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

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.3 Acceptance of Bid (Award)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

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

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

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

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

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

- .4 Building Information Modeling Exhibit, if completed:

.5 Drawings

Number	Title	Date
---------------	--------------	-------------

.6 Specifications

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

.7 Addenda:

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

.8 Other Exhibits:

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

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

The Sustainability Plan:

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

Supplementary and other Conditions of the Contract:

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

.9 Other documents listed below:

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

Additions and Deletions Report for **AIA® Document A701® – 2018**

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 09:47:02 ET on 12/23/2024.

PAGE 1

Warren Williams ES Security Improvements
Warren Williams Elementary School
901 Lawrence Street
Sanford, NC 27330

...

Lee County Schools
106 Gordon Street
Sanford, NC 27332

...

Hite Associates, P.C.
2600 Meridian Drive
Greenville, NC 27834
Telephone Number: 252-757-0333

PAGE 3

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect ~~at least seven days s~~ prior to the date for receipt of Bids.

PAGE 4

§ 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.

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:47:02 ET on 12/23/2024 under Order No. 4104247004 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ - 2018, Instructions to Bidders, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

ARTICLE 3

ADD subparagraph 3.4: In addition to obtaining Bidding Documents from the Hite Associates website, qualified bidders, subcontractors, material suppliers may obtain complete or partial sets of the Drawings Bidding Documents and specifications from SpeedyBlue Printers for the cost of printing and mailing.

ADD subparagraph 3.5: All Bidders, subcontractors, and material suppliers are to use the Hite Associates website only, for accurate and complete Bid Documents. The Owner nor the Designers will be responsible for information accessed from any other source.

ARTICLE 4

ADD: Bidders must identify the type of proposal clearly on the Bid Envelope, and include State License number thereon.

ARTICLE 7

ADD: Furnish a Performance Bond and a Labor and Material Payment Bond in the amount of the Contract Price, covering faithful performance of contract and payment of all obligations arising thereunder on AIA Document A312.

FORM OF PROPOSAL

Security Improvements and Door Replacements for Warren Williams Elementary School

From: _____ Contract: GENERAL

Address: _____

To: Lee County Date: _____

The undersigned, as bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud.

The bidder further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the places where the work is to be done, that he has examined the specifications for the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees if this proposal is accepted to contract with Lee County Schools, in the form of contract specified below, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of the: Security Improvements for Warren Williams Elementary School in full in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the Owner and / or Architect, with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the Contract Documents, for the sum of:

SINGLE PRIME CONTRACT (ALL WORK): _____

Combined Base Bid:

_____ Dollars(\$)

Plumbing Subcontractor: _____

Electrical Subcontractor: _____

Mechanical Subcontractor: _____

FORM OF PROPOSAL FOR CONSTRUCTION WORK SECURITY IMPROVEMENTS FOR WARREN WILLIAMS ELEMENTARY SCHOOL

ALTERNATES:

Should any of the alternates as described in the contract documents be accepted, the amount written below shall be the amount to be added to the base bid.

ALTERNATE NO. G-1: Shall be the amount added to the Base Bid to provide door hardware manufacturers as specified in Section 08700, in lieu of other, equivalent manufacturers:

(Add) _____ Dollars(\$)

ALTERNATE NO. G-2: Shall be the amount added to the Base Bid to provide a Door Access Security System manufactured by S2 Netbox as specified, in lieu of other, equivalent manufacturers.

(Add) _____ Dollars (\$)

UNIT PRICES:

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the scope of the work all in accordance with the contract documents.

ITEM #	DESCRIPTION	UNIT PRICE
1	Foundation Under Cut Excavation (Disposal OFF Site)	_____ c.y. (cubic yard)
2	Off-Site Select Borrow Fill	_____ c.y. (cubic yard)
3	#57 or #67 Stone (Wall foundations)	_____ c.y. (cubic yard)
4	4" Thick Concrete Sidewalk	_____ s.y. (square yard)

TIME

The Bidder further proposes and agrees hereby to commence work on a date specified in the Architect's Notice to Proceed, and to complete all work according to the schedule of dates set under Article 8 "Time" of the Supplementary Conditions, WHICH ARE DATES CERTAIN, with no allowance for delays except as may be caused by the Owner. Applicable liquidated damages shall be as stated in the Supplementary General Conditions.

HUB PARTICIPATION REQUIREMENTS:

Provide with the bid - Under GS 143-128.2(c) the undersigned bidder shall identify **on its bid** (Identification of HUB Participation Form) the HUB businesses that it will use on the project with the total dollar value of the bids that will be performed by the HUB businesses. **Also** list the good faith efforts (Affidavit **A**) made to solicit HUB participation in the bid effort.

NOTE: A contractor that performs all of the work with its own workforce may submit an Affidavit (**B**) to that effect in lieu of Affidavit (**A**) required above. The HUB Participation Form must still be submitted even if there is zero participation.

After the bid opening - The Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low bidder, the bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

An Affidavit (**C**) that includes a description of the portion of work to be executed by HUB businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort and Affidavit **D** is not necessary;

OR

If less than the 10% goal, Affidavit (**D**) of its good faith effort to meet the goal shall be provided. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of HUB businesses for participation in the contract.

Note:

Bidders must always submit **with their bid** the Identification of HUB Participation Form listing all HUB contractors, vendors and suppliers that will be used. If there is no HUB participation, then enter none or zero on the form. Affidavit A **or** Affidavit B, as applicable, also must be submitted with the bid. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder is grounds for rejection of the bid.

Proposal Signature Page

The undersigned further agrees that in the case of failure on his part to execute the said contract and the bonds within ten (10) consecutive calendar days after being given written notice of the award of contract by the Designer, as agent for the Owner, the certified check, cash or bid bond accompanying this bid shall be paid into the funds of the Owner's account set aside for the project, as liquidated damages for such failure; otherwise the certified check, cash or bid bond accompanying this proposal shall be returned to the undersigned.

Respectfully submitted this day of _____

(Name of firm or corporation making bid)

WITNESS:

By: _____
Signature

(Proprietorship or Partnership)

Name: _____
Print or type

Title _____
(Owner / Partner / President / Vice President)

Address _____

ATTEST:

By: _____

License No. _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

Federal I.D. No. _____

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 _____ Addendum No. 3 _____ Addendum No. 5 _____ Addendum No. 6 _____
Addendum No. 2 _____ Addendum No. 4 _____ Addendum No. 6 _____ Addendum No. 7 _____

GUIDELINES FOR RECRUITMENT AND SELECTION OF MINORITY BUSINESSES FOR PARTICIPATION IN CONSTRUCTION CONTRACTS

In accordance with G.S. 143-128.2 (effective January 1, 2002) these guidelines establish goals for minority participation in single-prime bidding, separate-prime bidding, construction manager at risk, and alternative contracting methods. The legislation provides that the Public Owner shall have a verifiable ten percent (10%) goal for participation by minority businesses in the total value of work for each project for which a contract or contracts are awarded. These requirements are published to accomplish that end.

SECTION A: INTENT

It is the intent of these guidelines that the Owner, as awarding authority for construction projects, and the contractors and subcontractors performing the construction contracts awarded shall cooperate and in good faith do all things legal, proper and reasonable to achieve the statutory goal of ten percent (10%) for participation by minority businesses in each construction project as mandated by GS 143-128.2. Nothing in these guidelines shall be construed to require contractors or awarding authorities to award contracts or subcontracts to or to make purchases of materials or equipment from minority-business contractors or minority-business subcontractors who do not submit the lowest responsible, responsive bid or bids.

SECTION B: DEFINITIONS

1. Minority - a person who is a citizen or lawful permanent resident of the United States and who is:
 - a. Black, that is, a person having origins in any of the black racial groups in Africa;
 - b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
 - c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, the Pacific Islands;
 - d. American Indian, that is, a person having origins in any of the original peoples of North America; or
 - e. Female
2. Minority Business - means a business:
 - a. In which at least fifty-one percent (51%) is owned by one or more minority persons, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
 - b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.
3. Socially and economically disadvantaged individual - means the same as defined in 15 U.S.C. 637. "Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities". "Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged".
4. Public Entity - means the Owner and all public subdivisions and local governmental units.
5. Owner - The public institution named in the contract.

6. Designer – Any person, firm, partnership, or corporation, which has contracted with the Owner to perform architectural or engineering work.
7. Bidder - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.
8. Contract - A mutually binding legal relationship or any modification thereof, obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.
9. Contractor - Any person, firm, partnership, corporation, association, or joint venture which has contracted with the State of North Carolina to perform construction work or repair.
10. Subcontractor - A firm under contract with the prime contractor or construction manager at risk for supplying materials or labor and materials and/or installation. The subcontractor may or may not provide materials in his subcontract.

SECTION C: RESPONSIBILITIES

1. Office for Historically Underutilized Businesses, Department of Administration (hereinafter referred to as HUB Office).

The HUB Office has established a program, which allows interested persons or businesses qualifying as a minority business under G.S. 143-128.2, to obtain certification in the State of North Carolina procurement system. The information provided by the minority businesses will be used by the HUB Office to:

- a. Identify those areas of work for which there are minority businesses, as requested.
- b. Make available to interested parties a list of prospective minority business contractors and subcontractors.
- c. Assist in the determination of technical assistance needed by minority business contractors.

In addition to being responsible for the certification/verification of minority businesses that want to participate in the State construction program, the HUB Office will:

- (1) Maintain a current list of minority businesses. The list shall include the areas of work in which each minority business is interested.
- (2) Inform minority businesses on how to identify and obtain contracting and subcontracting opportunities through the State and other public entities.
- (3) Inform minority businesses of the contracting and subcontracting process for public construction building projects.
- (4) Work with the North Carolina trade and professional organizations to improve the ability of minority businesses to compete in the State construction projects.
- (5) The HUB Office also oversees the minority business program by:
 - a. Monitoring compliance with the program requirements.
 - b. Assisting in the implementation of training and technical assistance programs.
 - c. Identifying and implementing outreach efforts to increase the utilization of minority businesses.
 - d. Reporting the results of minority business utilization to the Secretary of the Department of Administration, the Governor, and the General Assembly.

2. The Owner
The Owner will be responsible for the following:

- a. Reviewing the apparent low bidders' statutory compliance with the requirements listed in the proposal prior to award of contracts. The Owner reserves the right to reject any or all bids and to waive informalities.
 - b. Monitoring of contractors' compliance with minority business requirements in the contract documents during construction.
 - c. Providing statistical data and required reports to the HUB Office.
 - d. Resolving any protest and disputes arising after implementation of the plan.
3. Constituent Institutions of The State of North Carolina
Before awarding a contract, a constituent institution shall do the following:
- a. Implement the constituent institution HUB plan.
 - b. Attend the scheduled prebid conference.
 - c. At least 10 days prior to the scheduled day of bid opening, notify minority businesses that have requested notices from the public entity for public construction or repair work and minority businesses that otherwise indicated to the Office for Historically Underutilized Businesses an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification shall include the following:
 1. A description of the work for which the bid is being solicited.
 2. The date, time, and location where bids are to be submitted.
 3. The name of the individual within the owner's organization who will be available to answer questions about the project.
 4. Where bid documents may be reviewed.
 5. Any special requirements that may exist.
 - d. Utilize other media, as appropriate, likely to inform potential minority businesses of the bid being sought.
 - e. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
 - f. Review, jointly with the designer, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and affidavit listing good faith efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.
 - g. Evaluate documentation to determine good faith effort has been achieved for minority business utilization prior to recommendation of award.
 - h. Review prime contractors' pay applications for compliance with minority business utilization commitments prior to payment.
 - i. Document evidence of implementation of Owner's responsibilities.
4. Designer
Under the single-prime bidding, separate prime bidding, construction manager at risk, or alternative contracting method, the designer will:
- a. Attend the scheduled prebid conference to explain minority business requirements to the prospective bidders.
 - b. Assist the owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities.
 - c. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
 - d. Review jointly with the owner, all requirements of G.S. 143-128.2(c) and G.S.143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and affidavit listing Good Faith Efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.

- e. During construction phase of the project, review “MBE Documentation for Contract Payment” – (Appendix E) for compliance with minority business utilization commitments. Submit Appendix E form with monthly pay applications to the owner and forward copies to the Owner.
- f. Make documentation showing evidence of implementation of Designer’s responsibilities available for review by the Owner and HUB Office, upon request.

5. Prime Contractor(s), CM at Risk, and Its First-Tier Subcontractors

Under the single-prime bidding, the separate-prime bidding, construction manager at risk and alternative contracting methods, contractor(s) will:

- a. Attend the scheduled prebid conference.
- b. Identify or determine those work areas of a subcontract where minority businesses may have an interest in performing subcontract work.
- c. At least ten (10) days prior to the scheduled day of bid opening, notify minority businesses of potential subcontracting opportunities listed in the proposal. The notification will include the following:
 - (1) A description of the work for which the subbid is being solicited.
 - (2) The date, time and location where subbids are to be submitted.
 - (3) The name of the individual within the company who will be available to answer questions about the project.
 - (4) Where bid documents may be reviewed.
 - (5) Any special requirements that may exist, such as insurance, licenses, bonds and financial arrangements.

If there are more than three (3) minority businesses in the general locality of the project who offer similar contracting or subcontracting services in the specific trade, the contractor(s) shall notify three (3), but may contact more, if the contractor(s) so desires.

- d. During the bidding process, comply with the contractor(s) requirements listed in the proposal for minority participation.
- e. Identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).
- f. Make documentation showing evidence of implementation of PM, CM-at-Risk and First-Tier Subcontractor responsibilities available for review by the constituent institution and HUB Office, upon request.
- g. Upon being named the apparent low bidder, the Bidder shall provide one of the following: (1) an affidavit (Affidavit C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal; (2) if the percentage is not equal to the applicable goal, then documentation of all good faith efforts taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and award to the next lowest responsible and responsive bidder.
- h. The contractor(s) shall identify the name(s) of minority business subcontractor(s) and corresponding dollar amount of work on the schedule of values. The schedule of values shall be provided as required in Article 31 of the General Conditions of the Contract to facilitate payments to the subcontractors.
- i. The contractor(s) shall submit with each monthly pay request(s) and final payment(s), “MBE Documentation for Contract Payment” – (Appendix E), for designer’s review.
- j. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the Owner, and the Director of the HUB Office in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another minority business subcontractor.
- k. If during the construction of a project additional subcontracting opportunities become available, make a good faith effort to solicit subbids from minority businesses.
- l. It is the intent of these requirements apply to all contractors performing as prime contractor and first tier subcontractor under construction manager at risk on state projects.

6. Minority Business Responsibilities

While minority businesses are not required to become certified in order to participate in the State construction projects, it is recommended that they become certified and should take advantage of the appropriate technical assistance that is made available. In addition, minority businesses who are contacted by owners or bidders must respond promptly whether or not they wish to submit a bid.

SECTION D: DISPUTE PROCEDURES

It is the policy of this state that disputes that involves a person's rights, duties or privileges, should be settled through informal procedures. To that end, minority business disputes arising under these guidelines should be resolved as governed under G.S. 143-128(g).

SECTION E: These guidelines shall apply upon promulgation on University construction projects.

Copies of these guidelines may be obtained from:

<http://www.NorthCarolina.edu/finance/projects/projects.cfm#attachments>

SECTION F: In addition to these guidelines, there will be issued with each construction bid package provisions for contractual compliance providing MBE participation in State building projects. An explanation of the process follows, titled “MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)” along with relevant forms for its implementation (“Identification of Minority Business Participation” form, Affidavits A, B, C, D and Appendix E).

MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

APPLICATION:

The **Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts** are hereby made a part of these contract documents. These guidelines shall apply to all contractors regardless of ownership. Copies of these guidelines may be obtained from: <http://www.NorthCarolina.edu/finance/projects/projects.cfm#attachments>

MINORITY BUSINESS SUBCONTRACT GOALS:

The goals for participation by minority firms as subcontractors on this project have been set at 10%.

The bidder must identify on its bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit (Affidavit A) listing good faith efforts **or** affidavit (Affidavit B) of self-performance of work, if the bidder will perform work under contract by its own workforce, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).

The lowest responsible, responsive bidder must provide Affidavit C, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal.

OR

Provide Affidavit C, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, **with documentation of Good Faith Effort, if the percentage is not equal to the applicable goal.**

OR

Provide Affidavit B, which includes sufficient information for the State to determine that the bidder does not customarily subcontract work on this type project.

The above information must be provided as required. Failure to submit these documents is grounds for rejection of the bid.

MINIMUM COMPLIANCE REQUIREMENTS:

All written statements, affidavits or intentions made by the Bidder shall become a part of the agreement between the Contractor and the Owner for performance of this contract. 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 the Owner 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 the Owner whether to terminate the contract for breach.

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

- (1) Contacting 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 or proposal date and notifying them of the nature and scope of the work to be performed.
- (2) Making 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 bid or proposals are due.
- (3) Breaking down or combining elements of work into economically feasible units to facilitate minority participation.
- (4) Working with minority trade, community, or contractor organizations identified by the Office for Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- (5) Attending any prebid meetings scheduled by the public owner.
- (6) Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors.
- (7) Negotiating in good faith with interested minority businesses and not rejecting 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) Providing 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. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- (9) Negotiating 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) Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

Identification of Minority Business Participation

I, _____,
(Bidder)

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

Firm Name, Address and Phone #	Work type	*Minority Category

*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

The total value of minority business contracting will be (\$) _____.

AFFIDAVIT A – Listing of the Good Faith Effort

County of _____

Affidavit of _____
(Bidder)

I have made a good faith effort to comply under the following areas checked:
(A minimum of 5 areas must be checked in order to have achieved a "good faith effort")

- 1 - 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 - 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 - Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- 4 - 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 - Attended prebid meetings scheduled by the public owner.
- 6 - Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- 7 - 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 - 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 - 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 - Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

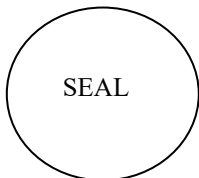
In accordance with GS143-128.2(d) the undersigned will enter into a formal agreement with the firms Listed, in the Identification of Minority Business Participation schedule conditional upon execution of a contract with the Owner. Failure to abide by this statutory provision will constitute a breach of the contract.

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

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____
Subscribed and sworn to before me this _____ day of _____ 20____
Notary Public _____
My commission expires _____

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

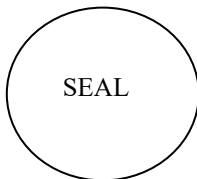
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

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: _____



State of North Carolina, County of _____

Subscribed and sworn to before me this _____ day of _____ 20__

Notary Public _____

My commission expires _____

AFFIDAVIT C - Portion of the Work to be Performed by Minority Firms

Project _____

*******(NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL)*******

If the portion of the work to be executed by minority businesses as defined in GS143-128.2(g) is equal to or greater than 10% 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
(Bidder)

_____ (Project Name)

Amount of Bid \$ _____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises. Minority 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	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

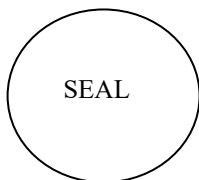
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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: _____



State of North Carolina, County of _____
 Subscribed and sworn to before me this _____ day of _____ 20____
 Notary Public _____
 My commission expires _____

AFFIDAVIT D – Good Faith Efforts

Project _____

If the goal of 10% participation by minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts

(Bidder

Affidavit of: _____)

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name and Phone Number	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions.

Examples of documentation shall include the following evidence:

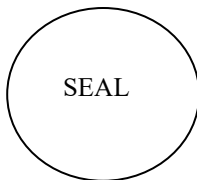
- A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to 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 businesses 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.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of North Carolina, County of _____

Subscribed and sworn to before me this _____ day of _____ 20 _____

Notary Public _____

My commission expires _____

APPENDIX E

MBE DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor/Architect: _____

Address & Phone: _____

Project Name: _____

Pay Application #: _____ Period: _____

The following is a list of payments to be made to minority business contractors on this project for the above-mentioned period.

Firm Name	*Minority Category	Payment Amount (List invoice number and amount)	Owner Use Only

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Date: _____ Approved/Certified By: _____

Name

Title

Signature

****THIS DOCUMENT MUST BE SUBMITTED WITH EACH PAY REQUEST & FINAL PAYMENT****

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a
STIPULATED SUM

AGREEMENT made as of the « » day of « » in the year «2025 »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

«Lee County Schools »
«106 Gordon Street »
«Sanford, NC 27330 »
« »

and the Contractor:
(Name, legal status, address and other information)

«xyz »«CONTRACTOR »
« »
« »
« »

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

«Security Improvements for Warren Williams Elementary School »
«Lee County, North Carolina »
« »

The Architect:
(Name, legal status, address and other information)

«Hite Associates, PC »« »
«2600 Meridian Drive »
«Greenville, NC 27834 »
« »

The Owner and Contractor agree as follows.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS**
- 2 THE WORK OF THIS CONTRACT**
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION**
- 4 CONTRACT SUM**
- 5 PAYMENTS**
- 6 DISPUTE RESOLUTION**
- 7 TERMINATION OR SUSPENSION**
- 8 MISCELLANEOUS PROVISIONS**
- 9 ENUMERATION OF CONTRACT DOCUMENTS**
- 10 INSURANCE AND BONDS**

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

“Each Prime Contractor shall execute the entire Work described in the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. In general, the Work includes but is not limited to the furnishing of all labor, materials, equipment, tools, services and supervision to perform the Work for the project”.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

Seven days from receipt of Notice to Proceed.

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner’s time requirement shall be as follows:

« »

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

In accordance with the schedule of COMPLETION DATES set forth in the Supplementary Conditions, under Article 8, "Time", all of which are DATES CERTAIN, with no delays allowed except as caused by the Owner.

« »

Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

«
 Substantial Completion liquidated damages- \$100 per day.
 Final Completion liquidated damages - \$100 per day.
 See Section 9.11 of the General and Article 8 of Supplemental Conditions for additional provisions regarding liquidated damages.
 »

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » (\$ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 4.3 Unit prices, if any: See Form of Proposal
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit (\$0.00)

§ 4.4 Allowances included in the Contract Sum, if any: See Form of Proposal
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« One calendar month ending on the twenty-fifth day of the month. »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment. *(Federal, state or local laws may require payment within a certain period of time.)*

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be 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.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage as outlined in Section 9.3.1.3 of the General and Supplemental Conditions . Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction, as amended;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage as outlined in Section 9.3.1.3 of the General and Supplemental Conditions;
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007, as amended.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- .1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and *(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)*

- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007, as amended.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

«
See Section 9.3 of the General and Supplemental Conditions.
»

§ 5.1.9 Except with the Owner’s prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, as amended, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner’s final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect’s final Certificate for Payment, or as follows:

« »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, as amended, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

«
The Architect shall be the Initial Decision Maker as outlined in Article 15 of the General and Supplemental Conditions.
»
« »
« »
« »

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, as amended, the method of binding dispute resolution shall be as follows:

(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[] Litigation in a court of competent jurisdiction

« »

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007, as amended.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007, as amended.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007, as amended or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall not bear interest.
(Insert rate of interest agreed upon, if any.)

« Zero » % «0% »

§ 8.3 The Owner’s representative:
(Name, address and other information)

« »
« »
« »
« »
« »
« »

§ 8.4 The Contractor’s representative:
(Name, address and other information)

« »
« »
« »
« »
« »
« »

§ 8.5 Neither the Owner’s nor the Contractor’s representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction, as amended. The amended version of AIA Document A201-2007 is included in the Project Manual.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
Section 01010	General Conditions	May 8, 2014	pp. 1-54
Section 01012	Supplementary General	May 8, 2014	pp. 1-6

§ 9.1.4 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

«See Exhibit A »

Section	Title	Date	Pages

§ 9.1.5 The Drawings:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

«See Exhibit B »

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

- .1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

« »

- .2 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

«FORM OF PROPOSAL »

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007, as amended.

This Agreement entered into as of the day and year first written above.

Lee County Schools
106 Gordon Street
Sanford, NC 27330

OWNER *(Signature)*

CONTRACTOR *(Signature)*

« »«Board Chairperson »
(Printed name and title)

« »«President »
(Printed name and title)

Attest

Attest

Superintendent

Corporate Secretary

[Corporate Seal]

[Corporate Seal]

This instrument has been preaudited
in the manner required by the School
Budget and Fiscal Control Act.

Finance Officer/Date

for the following PROJECT:

(Name and location or address)

Warren Williams Security and Door Replacement Project
Lee County, NC

THE OWNER:

(Name and address)

Lee County Board of Education
106 Gordon Street
Sanford, NC 27330

THE ARCHITECT:

(Name and address)

Hite Associates, PC
2600 Meridian Drive
Greenville, NC 27834

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS**
- 2 OWNER**
- 3 CONTRACTOR**
- 4 ARCHITECT**
- 5 SUBCONTRACTORS**
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**
- 7 CHANGES IN THE WORK**
- 8 TIME**
- 9 PAYMENTS AND COMPLETION**
- 10 PROTECTION OF PERSONS AND PROPERTY**
- 11 INSURANCE AND BONDS**
- 12 UNCOVERING AND CORRECTION OF WORK**
- 13 MISCELLANEOUS PROVISIONS**
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT**
- 15 CLAIMS AND DISPUTES**

INDEX

(Numbers and Topics in Bold are Section Headings)

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3

Access to Work

3.16, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.4.2, 13.7.1, 14.1, 15.2

Addenda

1.1.1, 3.11.1

Additional Costs, Claims for

3.7.4, 3.7.5, 6.1.1, 7.3.7.5, 10.3, 15.1.4

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.5**

Additional Insured

11.1.4

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.5**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8, 7.3.8

All-risk Insurance

11.3.1, 11.3.1.1

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.6.3, 9.7.1, 9.10, 11.1.3

Approvals

2.1.1, 2.2.2, 2.4, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10, 4.2.7, 9.3.2, 13.5.1

Arbitration

8.3.1, 11.3.10, 13.1.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.4.1, 3.12.7, 4.1, 4.2, 5.2, 6.3.1, 7.1.2, 7.3.7, 7.4, 9.2.1, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.5.1, 13.5.2, 14.2.2, 14.2.4, 15.1.3, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4.1, 9.4.2, 9.5.3, 9.6.4, 15.1.3, 15.2

Architect's Additional Services and Expenses

2.4.1, 11.3.1.1, 12.2.1, 13.5.2, 13.5.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 4.2, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.4.1, 3.1.3, 3.5.1, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5.1, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3.1, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2.1, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.5.2, 15.2, 15.3

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.5

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.5.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.4.2, 13.5, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1, 5.2.1, 11.4.1

Binding Dispute Resolution

9.7.1, 11.3.9, 11.3.10, 13.1.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.4.1

Boiler and Machinery Insurance

11.3.2

Bonds, Lien

7.3.7.4, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.7.4, 9.6.7, 9.10.3, 11.3.9, **11.4**

Building Permit

3.7.1

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7.1, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.3

Certificates of Inspection, Testing or Approval
13.5.4

Certificates of Insurance
9.10.2, 11.1.3

Change Orders

1.1.1, 2.4.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11.1, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3

Change Orders, Definition of
7.2.1

CHANGES IN THE WORK

2.2.1, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 7.4.1, 8.3.1, 9.3.1.1, 11.3.9

Claims, Definition of
15.1.1

CLAIMS AND DISPUTES

3.2.4, 6.1.1, 6.3.1, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4

Claims and Timely Assertion of Claims
15.4.1

Claims for Additional Cost

3.2.4, 3.7.4, 6.1.1, 7.3.9, 10.3.2, **15.1.4**

Claims for Additional Time

3.2.4, 3.7.4.6.1.1, 8.3.2, 10.3.2, **15.1.5**

Concealed or Unknown Conditions, Claims for **3.7.4**

Claims for Damages
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6

Claims Subject to Arbitration
15.3.1, 15.4.1

Cleaning Up

3.15, 6.3

Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.3.1, 11.3.6, 11.4.1, 15.1.4

Commencement of the Work, Definition of
8.1.2

Communications Facilitating Contract Administration

3.9.1, **4.2.4**

Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 13.7, 14.1.2

COMPLETION, PAYMENTS AND **9**

Completion, Substantial
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7

Compliance with Laws
1.6.1, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions
3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract

1.1.1, 6.1.1, 6.1.4

Consent, Written

3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.3.1, 13.2, 13.4.2, 15.4.4.2

Consolidation or Joinder **15.4.4**

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

1.1.4, **6**

Construction Change Directive, Definition of
7.3.1

Construction Change Directives

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1

Construction Schedules, Contractor's
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Contingent Assignment of Subcontracts
5.4, 14.2.2.2

Continuing Contract Performance **15.1.3**

Contract, Definition of
1.1.2

CONTRACT, TERMINATION OR SUSPENSION OF THE 5.4.1.1, 11.3.9, **14**

Contract Administration

3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to
3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1

Contract Documents, The **1.1.1**

Contract Documents, Copies Furnished and Use of
1.5.2, 2.2.5, 5.3

Contract Documents, Definition of
1.1.1

Contract Sum

3.7.4, 3.8, 5.2.3, 7.2, 7.3, 7.4, **9.1**, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1, 14.2.4, 14.3.2, 15.1.4, 15.2.5

Contract Sum, Definition of
9.1

Contract Time

3.7.4, 3.7.5, 3.10.2, 5.2.3, 7.2.1.3, 7.3.1, 7.3.5, 7.4, 8.1.1, 8.2.1, 8.3.1, 9.5.1, 9.7.1, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5

Contract Time, Definition of
8.1.1

CONTRACTOR **3**

Contractor, Definition of
3.1, **6.1.2**

Contractor's Construction Schedules

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Contractor's Employees

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1,

Contractor's Liability Insurance
11.1

Contractor's Relationship with Separate Contractors and Owner's Forces
3.12.5, 3.14.2, 4.2.4, 6, 11.3.7, 12.1.2, 12.2.4
Contractor's Relationship with Subcontractors
1.2.2, 3.3.2, 3.18.1, 3.18.2, 5, 9.6.2, 9.6.7, 9.10.2, 11.3.1.2, 11.3.7, 11.3.8
Contractor's Relationship with the Architect
1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.5, 15.1.2, 15.2.1
Contractor's Representations
3.2.1, 3.2.2, 3.5.1, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2
Contractor's Responsibility for Those Performing the Work
3.3.2, 3.18, 5.3.1, 6.1.3, 6.2, 9.5.1, 10.2.8
Contractor's Review of Contract Documents
3.2
Contractor's Right to Stop the Work
9.7
Contractor's Right to Terminate the Contract
14.1, 15.1.6
Contractor's Submittals
3.10, 3.11, 3.12.4, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2
Contractor's Superintendent
3.9, 10.2.6
Contractor's Supervision and Construction Procedures
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3
Contractual Liability Insurance
11.1.1.8, 11.2
Coordination and Correlation
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1
Copies Furnished of Drawings and Specifications
1.5, 2.2.5, 3.11
Copyrights
1.5, **3.17**
Correction of Work
2.3, 2.4, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**
Correlation and Intent of the Contract Documents 1.2
Cost, Definition of
7.3.7
Costs
2.4.1, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.7, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.3, 12.1.2, 12.2.1, 12.2.4, 13.5, 14
Cutting and Patching
3.14, 6.2.5
Damage to Construction of Owner or Separate Contractors
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3, 12.2.4
Damage to the Work
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4.1, 11.3.1, 12.2.4
Damages, Claims for
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6

Damages for Delay
6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2
Date of Commencement of the Work, Definition of
8.1.2
Date of Substantial Completion, Definition of
8.1.3
Day, Definition of
8.1.4
Decisions of the Architect
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 15.2, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2.1, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.5.2, 14.2.2, 14.2.4, 15.1, 15.2
Decisions to Withhold Certification
9.4.1, **9.5**, 9.7, 14.1.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of
2.3.1, 2.4.1, 3.5.1, 4.2.6, 6.2.5, 9.5.1, 9.5.2, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1
Defective Work, Definition of
3.5.1
Definitions
1.1, 2.1.1, 3.1.1, 3.5.1, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 15.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1
Delays and Extensions of Time
3.2., 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4.1, **8.3**, 9.5.1, 9.7.1, 10.3.2, 10.4.1, 14.3.2, 15.1.5, 15.2.5
Disputes
6.3.1, 7.3.9, 15.1, 15.2
Documents and Samples at the Site
3.11
Drawings, Definition of
1.1.5
Drawings and Specifications, Use and Ownership of
3.11
Effective Date of Insurance
8.2.2, 11.1.2
Emergencies
10.4, 14.1.1.2, 15.1.4
Employees, Contractor's
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1
Equipment, Labor, Materials or
1.1.3, 1.1.6, 3.4, 3.5.1, 3.8.2, 3.8.3, 3.12, 3.13.1, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5.1, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.5, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3
Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4.1, 9.5.1, 9.7.1, 10.3.2, 10.4.1, 14.3, 15.1.5, 15.2.5
Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
Faulty Work
(See Defective or Nonconforming Work)
Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 11.1.2, 11.1.3, 11.3.1, 11.3.5, 12.3.1, 14.2.4, 14.4.3
Financial Arrangements, Owner's

2.2.1, 13.2.2, 14.1.1.4
Fire and Extended Coverage Insurance
11.3.1.1
GENERAL PROVISIONS
1
Governing Law
13.1
Guarantees (*See Warranty*)
Hazardous Materials
10.2.4, **10.3**
Identification of Subcontractors and Suppliers
5.2.1
Indemnification
3.17.1, **3.18**, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2, 11.3.7
Information and Services Required of the Owner
2.1.2, **2.2**, 3.2.2, 3.12.4, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2.1, 11.4, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3
Initial Decision
15.2
Initial Decision Maker, Definition of
1.1.8
Initial Decision Maker, Decisions
14.2.2, 14.2.4, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Initial Decision Maker, Extent of Authority
14.2.2, 14.2.4, 15.1.3, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Injury or Damage to Person or Property
10.2.8, 10.4.1
Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 12.2.1, 13.5
Instructions to Bidders
1.1.1
Instructions to the Contractor
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.5.2
Instruments of Service, Definition of
1.1.7
Insurance
3.18.1, 6.1.1, 7.3.7, 9.3.2, 9.8.4, 9.9.1, 9.10.2, **11**
Insurance, Boiler and Machinery
11.3.2
Insurance, Contractor's Liability
11.1
Insurance, Effective Date of
8.2.2, 11.1.2
Insurance, Loss of Use
11.3.3
Insurance, Owner's Liability
11.2
Insurance, Property
10.2.5, **11.3**
Insurance, Stored Materials
9.3.2, 11.4.1.4
INSURANCE AND BONDS
11
Insurance Companies, Consent to Partial Occupancy
9.9.1, 11.4.1.5
Insurance Companies, Settlement with

11.4.10
Intent of the Contract Documents
1.2.1, 4.2.7, 4.2.12, 4.2.13, 7.4
Interest
13.6
Interpretation
1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1
Interpretations, Written
4.2.11, 4.2.12, 15.1.4
Judgment on Final Award
15.4.2
Labor and Materials, Equipment
1.1.3, 1.1.6, **3.4**, 3.5.1, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2
Labor Disputes
8.3.1
Laws and Regulations
1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13.1, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1.1, 11.3, 13.1.1, 13.4, 13.5.1, 13.5.2, 13.6.1, 14, 15.2.8, 15.4
Liens
2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8
Limitations, Statutes of
12.2.5, 13.7, 15.4.1.1
Limitations of Liability
2.3.1, 3.2.2, 3.5.1, 3.12.10, 3.17.1, 3.18.1, 4.2.6, 4.2.7, 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 10.2.5, 10.3.3, 11.1.2, 11.2.1, 11.3.7, 12.2.5, 13.4.2
Limitations of Time
2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7, 5.2, 5.3.1, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2.1, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7.1, 9.8, 9.9, 9.10, 11.1.3, 11.3.1.5, 11.3.6, 11.3.10, 12.2, 13.5, 13.7, 14, 15
Loss of Use Insurance
11.3.3
Material Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.6, 9.10.5
Materials, Hazardous
10.2.4, **10.3**
Materials, Labor, Equipment and
1.1.3, 1.1.6, 1.5.1, 3.4.1, 3.5.1, 3.8.2, 3.8.3, 3.12, 3.13.1, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2
Means, Methods, Techniques, Sequences and Procedures of Construction
3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2
Mechanic's Lien
2.1.2, 15.2.8
Mediation
8.3.1, 10.3.5, 10.3.6, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1
Minor Changes in the Work
1.1.1, 3.12.8, 4.2.8, 7.1, **7.4**
MISCELLANEOUS PROVISIONS
13
Modifications, Definition of
1.1.1
Modifications to the Contract

1.1.1, 1.1.2, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7.1, 10.3.2, 11.3.1

Mutual Responsibility

6.2

Nonconforming Work, Acceptance of

9.6.6, 9.9.3, **12.3**

Nonconforming Work, Rejection and Correction of
2.3.1, 2.4.1, 3.5.1, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2.1

Notice

2.2.1, 2.3.1, 2.4.1, 3.2.4, 3.3.1, 3.7.2, 3.12.9, 5.2.1, 9.7.1, 9.10, 10.2.2, 11.1.3, 11.4.6, 12.2.2.1, 13.3, 13.5.1, 13.5.2, 14.1, 14.2, 15.2.8, 15.4.1

Notice, Written

2.3.1, 2.4.1, 3.3.1, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 9.7.1, 9.10, 10.2.2, 10.3, 11.1.3, 11.3.6, 12.2.2.1, **13.3**, 14, 15.2.8, 15.4.1

Notice of Claims

3.7.4, 4.5, 10.2.8, **15.1.2**, 15.4

Notice of Testing and Inspections

13.5.1, 13.5.2

Observations, Contractor's

3.2, 3.7.4

Occupancy

2.2.2, 9.6.6, 9.8, 11.3.1.5

Orders, Written

1.1.1, 2.3, 3.9.2, 7, 8.2.2, 11.3.9, 12.1, 12.2.2.1, 13.5.2, 14.3.1

OWNER

2

Owner, Definition of

2.1.1

Owner, Information and Services Required of the

2.1.2, **2.2**, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2.1, 11.3, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3

Owner's Authority

1.5, 2.1.1, 2.3.1, 2.4.1, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.1.3, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3.1, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.1.3, 11.3.3, 11.3.10, 12.2.2, 12.3.1, 13.2.2, 14.3, 14.4, 15.2.7

Owner's Financial Capability

2.2.1, 13.2.2, 14.1.1.4

Owner's Liability Insurance

11.2

Owner's Loss of Use Insurance

11.3.3

Owner's Relationship with Subcontractors

1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

Owner's Right to Carry Out the Work

2.4, 14.2.2

Owner's Right to Clean Up

6.3

Owner's Right to Perform Construction and to Award Separate Contracts

6.1

Owner's Right to Stop the Work

2.3

Owner's Right to Suspend the Work

14.3

Owner's Right to Terminate the Contract

14.2

Ownership and Use of Drawings, Specifications and Other Instruments of Service

1.1.1, 1.1.6, 1.1.7, **1.5**, 2.2.5, 3.2.2, 3.11.1, 3.17.1, 4.2.12, 5.3.1

Partial Occupancy or Use

9.6.6, **9.9**, 11.3.1.5

Patching, Cutting and

3.14, 6.2.5

Patents

3.17

Payment, Applications for

4.2.5, 7.3.9, 9.2.1, **9.3**, 9.4, 9.5, 9.6.3, 9.7.1, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

Payment, Certificates for

4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7.1, 9.10.1, 9.10.3, 13.7, 14.1.1.3, 14.2.4

Payment, Failure of

9.5.1.3, **9.7**, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2

Payment, Final

4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.4.1, 11.4.5, 12.3.1, 13.7, 14.2.4, 14.4.3

Payment Bond, Performance Bond and

7.3.7.4, 9.6.7, 9.10.3, 11.4.9, **11.4**

Payments, Progress

9.3, **9.6**, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3

PAYMENTS AND COMPLETION

9

Payments to Subcontractors

5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 11.4.8, 14.2.1.2

PCB

10.3.1

Performance Bond and Payment Bond

7.3.7.4, 9.6.7, 9.10.3, 11.4.9, **11.4**

Permits, Fees, Notices and Compliance with Laws

2.2.2, **3.7**, 3.13, 7.3.7.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF

10

Polychlorinated Biphenyl

10.3.1

Product Data, Definition of

3.12.2

Product Data and Samples, Shop Drawings

3.11, **3.12**, 4.2.7

Progress and Completion

4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.3

Progress Payments

9.3, **9.6**, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3

Project, Definition of the

1.1.4

Project Representatives

4.2.10

Property Insurance

10.2.5, **11.3**

PROTECTION OF PERSONS AND PROPERTY

10

Regulations and Laws
1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4

Rejection of Work
3.5.1, 4.2.6, 12.2.1

Releases and Waivers of Liens
9.10.2

Representations
3.2.1, 3.5.1, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1

Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1

Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.3, 5.3.1, 6.1.3, 6.2, 6.3, 9.5.1, 10

Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3

Review of Contract Documents and Field Conditions by Contractor
3.2, 3.12.7, 6.1.3

Review of Contractor's Submittals by Owner and Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2

Review of Shop Drawings, Product Data and Samples by Contractor
3.12

Rights and Remedies
1.1.2, 2.3, 2.4, 3.5.1, 3.7.4, 3.15.2, 4.2.6, 4.5, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, **13.4**, 14, 15.4

Royalties, Patents and Copyrights
3.17

Rules and Notices for Arbitration
15.4.1

Safety of Persons and Property
10.2, 10.4

Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3.1, **10.1**, 10.2, 10.4

Samples, Definition of
3.12.3

Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.7

Samples at the Site, Documents and
3.11

Schedule of Values
9.2, 9.3.1

Schedules, Construction
1.4.1.2, 3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 11.4.7, 12.1.2

Shop Drawings, Definition of
3.12.1

Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.7

Site, Use of
3.13, 6.1.1, 6.2.1

Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.4.2, 9.10.1, 13.5

Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5

Special Inspections and Testing
4.2.6, 12.2.1, 13.5

Specifications, Definition of the
1.1.6

Specifications, The
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14

Statute of Limitations
13.7, 15.4.1.1

Stopping the Work
2.3, 9.7, 10.3, 14.1

Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4, 11.4.1.4

Subcontractor, Definition of
5.1.1

SUBCONTRACTORS
5

Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7

Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 11.4.7, 11.4.8, 14.1, 14.2.1

Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3, 11.1.3

Submittal Schedule
3.10.2, 3.12.5, 4.2.7

Subrogation, Waivers of
6.1.1, 11.4.5, **11.3.7**

Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2, 13.7

Substantial Completion, Definition of
9.8.1

Substitution of Subcontractors
5.2.3, 5.2.4

Substitution of Architect
4.1.3

Substitutions of Materials
3.4.2, 3.5.1, 7.3.8

Sub-subcontractor, Definition of
5.1.2

Subsurface Conditions
3.7.4

Successors and Assigns
13.2

Superintendent
3.9, 10.2.6

Supervision and Construction Procedures
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.3

Surety
5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7

Surety, Consent of
9.10.2, 9.10.3

Surveys
2.2.3

Suspension by the Owner for Convenience

14.3

Suspension of the Work

5.4.2, 14.3

Suspension or Termination of the Contract

5.4.1.1, 11.4.9, 14

Taxes

3.6, 3.8.2.1, 7.3.7.4

Termination by the Contractor

14.1, 15.1.6

Termination by the Owner for Cause

5.4.1.1, **14.2**, 15.1.6

Termination by the Owner for Convenience

14.4

Termination of the Architect

4.1.3

Termination of the Contractor

14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT

14

Tests and Inspections

3.1.3, 3.3.3, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 11.4.1.1, 12.2.1, **13.5**

TIME

8

Time, Delays and Extensions of

3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4.1, **8.3**, 9.5.1, 9.7.1, 10.3.2, 10.4.1, 14.3.2, 15.1.5, 15.2.5

Time Limits

2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 4.4, 4.5, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3, 11.4.1.5, 11.4.6, 11.4.10, 12.2, 13.5, 13.7, 14, 15.1.2, 15.4

Time Limits on Claims

3.7.4, 10.2.8, **13.7**, 15.1.2

Title to Work

9.3.2, 9.3.3

Transmission of Data in Digital Form

1.6

UNCOVERING AND CORRECTION OF WORK

12

Uncovering of Work

12.1

Unforeseen Conditions, Concealed or Unknown

3.7.4, 8.3.1, 10.3

Unit Prices

7.3.3.2, 7.3.4

Use of Documents

1.1.1, 1.5, 2.2.5, 3.12.6, 5.3

Use of Site

3.13, 6.1.1, 6.2.1

Values, Schedule of

9.2, 9.3.1

Waiver of Claims by the Architect

13.4.2

Waiver of Claims by the Contractor

9.10.5, 11.4.7, 13.4.2, 15.1.6

Waiver of Claims by the Owner

9.9.3, 9.10.3, 9.10.4, 11.4.3, 11.4.5, 11.4.7, 12.2.2.1, 13.4.2, 14.2.4, 15.1.6

Waiver of Consequential Damages

14.2.4, 15.1.6

Waiver of Liens

9.10.2, 9.10.4

Waivers of Subrogation

6.1.1, 11.4.5, **11.3.7**

Warranty

3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2, 13.7.1

Weather Delays

15.1.5.2

Work, Definition of

1.1.3

Written Consent

1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.4.1, 13.2, 13.4.2, 15.4.4.2

Written Interpretations

4.2.11, 4.2.12

Written Notice

2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7, 9.10, 10.2.2, 10.3, 11.1.3, 11.4.6, 12.2.2, 12.2.4, **13.3**, 14, 15.4.1

Written Orders

1.1.1, 2.3, 3.9, 7, 8.2.2, 11.4.9, 12.1, 12.2, 13.5.2, 14.3.1, 15.1.2

ARTICLE 1 GENERAL PROVISIONS

§ 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, Specifications, Addenda issued prior to execution of the Contract, 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, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect.

§ 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 except to the extent that these Contract Documents, or portions of these Contract Documents, have been incorporated into the Agreement(s) between the Owner and the Architect. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the 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.

§ 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 and diagrams.

§ 1.1.5.1 Dimensions indicated on the Drawings shall be followed. Do not scale drawings. Conflicts, discrepancies, and omissions shall be resolved prior to ordering or installing materials and equipment.

§ 1.1.5.2 The Contractor shall provide critical clearances, tolerances, and dimensions as indicated on the Drawings. These critical dimensions are not optional. The Architect shall be advised immediately if existing conditions do not permit critical dimensions as shown. No consideration will be given to any claim based on differences between the actual dimensions and those indicated on the drawings.

§ 1.1.5.3 Any modifications to the Drawings shall be approved by the Architect. The Architect's decision in matters relating to artistic effect and structural integrity will be final if consistent with the intent of the Contract Documents.

§ 1.1.5.4 The Drawings are developed to communicate design intent. Assemblies or components required to achieve this design intent are subject to approval by the Architect.

§ 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 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.

§ 1.2 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 only to the extent consistent with the Contract Documents and with terms reasonably inferable from them, though not expressly included in them, as being necessary to produce the indicated results.

§ 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 by any trade.

§ 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.

§ 1.3 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 AND EXECUTION OF THE CONTRACT DOCUMENTS

§ 1.4.1 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. These Contract Documents periodically refer to 2007 Editions of AIA Documents A201 and/or B101. In the interest of brevity, the Contract Documents may not always specify that each such reference is to AIA Documents A201 and/or B101 only as modified and amended by the Owner. Nonetheless, each reference to AIA Documents A201 and/or B101 is only to those documents as modified and amended by the Owner.

§ 1.4.2 The Contract Documents shall be signed by the Owner and Contractor in the places designated for their signatures. If either the Owner or Contractor or both do not sign all Contract Documents, the Architect shall identify such unsigned Documents and notify the Owner and Contractor.

§ 1.4.3 In the Contract Documents, where discrepancies are apparent, detailed information is lacking, or interpretation is not clear, the Contractor shall secure required information from the Architect in writing before proceeding with the work. Items that are detailed and/or specified, but not distinctly located on the drawings shall be located by the Architect upon the written request of the Contractor.

§ 1.5

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

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and joint owners with the Owner of their respective Instruments of Service, including the Drawings and Specifications, and will retain, with the Owner, all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. 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' reserved rights.

§ 1.5.2 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 without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 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 do so as 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 its written policies or otherwise in writing a representative who may have express authority to bind the Owner with respect to identified 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, where specifically authorized in writing, the Owner's authorized representative.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence within fifteen (15) days after its receipt of a request demonstrating the existence of one or more of the contractual bases for the request.

§ 2.2.2 Payment for permits and fees is the responsibility of the Contractor under the Contract Documents, including the payment of fees specified under Section 3.7.1. The Owner shall only pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities about which the Contractor notified the Owner in writing in advance of the execution of this Agreement..

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and any known utility locations for the site of the Project, and a legal description of the site. The information shown on the Drawings is based upon field surveys, plans from previous construction projects, and other

information provided by the Owner. It is the Contractor's responsibility to verify locations of items that may impact the construction of the work. The Contractor shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish other relevant information or services under the Owner's exclusive control, not also under the Architect's and/or Contractor's control, after the Contractor demonstrates to the Owner's satisfaction in writing that such other information or service under the Owner's exclusive control is necessary to the Contractor's performance of the Work and provides the Owner with a written request for such information or service. .

§ 2.2.4.1 The Owner shall not be responsible or have control over or charge of the construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the work, and the Owner will not be responsible for the Contractor's failure to carry out the Work in accordance with the contract documents.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2. Additional sets will be furnished at the cost of reproduction, postage and handling.

§ 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 ten-day period after service 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 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 or surety 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 Owner or 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 Specifications, Drawings and other 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 for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents. The Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information 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.

§ 3.2.2.1 The Contractor shall verify all grades, lines, levels and dimensions indicated or shown on the plans and specifications prior to beginning the Work and shall immediately report in writing any errors or inconsistencies to the Architect before commencing the Work.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations and makes the reports required in Sections 3.2.2 and 3.2.3, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 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, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below in this section, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or

procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Architect shall be solely responsible for any loss or damage arising solely from those Architect-required means, methods, techniques, sequences or procedures.

§ 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 solely 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 The general contractor shall be the project expediter for the project. In addition to the duties and responsibilities stated in this Agreement, the general contractor/project expediter shall perform the duties and obligations imposed on the general contractor and project expediter by State law.

§ 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, heat, 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 The Contractor shall use only new materials for the work of this Project. Reuse of existing materials or the use of other salvaged materials is acceptable only where specifically noted in the Construction Documents.

§ 3.4.1.2 The Contractor shall provide all special trims, moldings, and special shaped materials which are required for the satisfactory completion of the work. The Contractor shall provide all necessary fasteners, bracing, and supports required for the stable and secure installation of the Work.

§ 3.4.2 The Contractor may make substitutions only with the written consent of the Owner, after evaluation and approval by the Architect and in accordance with a Change Order or Construction Change Directive.

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

§ 3.4.4 After the contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the Contract Documents.

§ 3.4.5 By making request for substitutions based on subparagraphs 3.4.3 above, the Contractor: (1) represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified; (2) represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified; (3) certifies that the cost data presented is complete and includes all related costs under this contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently

become apparent; and (4) will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.

§ 3.4.6 The Contractor shall provide the Owner at least two copies of all manufacturer's literature and operating manuals for all equipment and materials installed on the Project. The Contractor shall also demonstrate operation and maintenance of all mechanical and electrical equipment or apparatus installed as part of the contract.

§ 3.4.7. Contractor shall comply with all applicable laws and regulations in providing services under this Agreement. Contractor represents that it is aware of and in compliance with the Immigration Reform and Control Act, and that it will collect properly verified I-9 forms from each employee providing services under this Agreement. Contractor shall not employ any individuals to provide services to the Owner who are not authorized by federal law to work in the United States.

§ 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, including substitutions not properly approved or authorized by the Owner, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by the Owner's 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 Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.6.2 The Contractor shall provide documentation of all sales tax paid in a format acceptable to the Owner with each pay application.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections performed or required 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.

§ 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 While the Contractor is not responsible for ensuring that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules, regulations, and lawful orders of public authorities, if the Contractor observes that portions of the Contract Documents are at variance with applicable laws, statutes, ordinances, codes, rules, regulations, or lawful orders of public authorities, the

Contractor shall promptly notify the Architect and Owner in writing, and the Architect shall make necessary changes through an appropriate modification.

§ 3.7.3 If the Contractor performs Work that it knew or should have known to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that 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, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than ten (10) 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 promptly notify the Owner and Contractor in writing, stating the reasons. If the Contractor disputes the Architect's determination or recommendation, the Contractor may proceed as provided in Article 15, giving the required notice of his/her dispute and stating a claim in writing to the Owner and the Architect within 21 days after the Architect has given notice of its decision. . The Contractor's failure to submit said claim in strict conformance with Article 15 shall be deemed a waiver of the claim and the Contractor shall not be entitled to any compensation associated with the claim.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Architect shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Architect but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15. The Contractor's failure to submit said claim in strict conformance with Article 15 shall be deemed a waiver of the claim and the Contractor shall not be entitled to any compensation associated with the claim.

§ 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 Contract Sum but not in the allowances; and

- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order 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 with reasonable promptness.

§ 3.8.4 In any situations in which the Contractor has provided a unit price for an allowance quantity for soil, rock or any other item identified in the bid documents, the unit price shall include all of the costs identified in Section 3.8.2.1. and the costs for unloading and handling at the site, installation, overhead, profit and other expenses associated with the item. If the quantity of the items included in the allowance is not used or exceeded during the Project, the Contract Sum shall be decreased or increased based upon the unit price amount by Change Order.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent, site foreman and necessary assistants who shall be in attendance at the Project site at all times during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract but not more than 14 days after the award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of the proposed project manager and 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 project manager or superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection. Notwithstanding the above, the Owner and Architect reserve the right to notify the Contractor of their reasonable objection to the project manager and/or superintendent after the 14-day period based upon their performance or failure to perform their duties and responsibilities.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection and shall promptly replace a project manager and/or superintendent subsequently objected to by the Owner and Architect pursuant to Section 3.9.2.. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 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 and use and for the Owner's and Architect's approval as to the completion date a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals 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 coordinated, expeditious and practicable execution of the Work and Project in cooperation with the other prime contractors on the Project. In the event the Project has been awarded as a multi-prime project, each of the prime contractors shall provide initial and updated schedule information to the Project Expediter as often and in any format reasonably requested by the Project Expediter.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly 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 general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 The general contractor shall be the project expediter for the Project. In addition to the duties and obligations stated in this Agreement, the general contractor/project expediter shall perform all duties and obligations imposed on the general contractor and project expediter by state law. It shall be the responsibility of the general contractor to integrate the construction schedules of the prime contractors into a project progress schedule that will show graphically, by a detailed bar chart, CPM, or other acceptable and approved methods, the projected progress of the Project from start to finish. The general contractor shall be responsible for providing adequate notice to all prime contractors to insure efficient continuity of all phases of the Project Work. All prime contractors shall review and conform their work to the approved progress schedule and fully inform the Project Expediter as to his work progress, including immediate notification of any work progress changes. The general contractor shall promptly notify Architect in writing of any Contractor's failure to progress the work in accordance with the schedule.

§ 3.10.5 All prime contractors shall be required to cooperate and consult with each other during the construction of this Project. Each prime contractor shall schedule and execute his work so as to cause no delay to other Contractors. Each prime contractor shall be financially responsible to the other prime contractors for delay caused by him to the other prime contractors on the Project.

§ 3.10.6 Each prime contractor is required to attend monthly job site progress conference called or scheduled by the Architect. Each prime contractor shall be represented at these job progress conferences by both home office and site personnel. These meetings shall be open to the subcontractors, materials suppliers, any others who can contribute toward maintaining required job progress. It shall be the principal purpose of these meetings, or conferences, to effect coordination, cooperation, and assistance in every practical way toward the end of maintaining progress the project on schedule and to complete the Project within the specified contract time. Each prime contractor shall be prepared to assess progress of the work as required in his particular contract and to recommend remedial measures for correction of progress as may be appropriate. The Architect or his representative shall be the coordinator of and preside over the conferences.

§ 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 Architect for inclusion in the submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 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.

§ 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.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) 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 Architect will specify all performance and design criteria that such services must satisfy. 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, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. 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. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents, but shall provide written notification to the Owner and Architect regarding any concerns or objections the Contractor may have regarding the design criteria.

§ 3.13 USE OF SITE

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

§ 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 All patching shall be performed by mechanics of the trades dictated by the materials used in the patching operations.

§ 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, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.15.3 The general construction contractor shall leave the completed work in conditions for occupancy by the Owner such that no cleaning, waxing, polishing, or other janitorial operations are required.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 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 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 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 The Contractor shall indemnify and hold harmless the Owner, Architect, and their agents and consultants, for damages, losses, or claims, including attorneys' fees and costs incurred in the defense of such claims, that arise solely from the negligent acts, errors and/or omissions, or failures to perform, by the Contractor, its employees, agents, or consultants. The parties agree that this indemnification clause is an "evidence of indebtedness" for purpose of N.C. Gen. Stat. § 6-21.2. The parties also specifically acknowledge that the Owner is a public body and it is the intent of the parties that the Owner not incur any expenses when the Contractor is solely responsible for the claims.

§ 3.18.2 In claims against any person or entity 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.

§ 3.19 CONTRACTOR'S REPRESENTATIONS

§ 3.19.1 By entering into this contract with the Owner, the Contractor represents and warrants the following, together with all other representations and warranties in the Contract Documents:

- .1 that he is experienced in and competent to perform the type of work required and to furnish the materials, supplies or equipment to be so performed or furnished by him;
- .2 that he is financially solvent, able to pay his debts as they mature, and possessed of sufficient working capital to initiate and complete the work required under the contract;
- .3 that he is familiar with all federal, state, county, and local laws, ordinances, permits, regulations, and resolutions which may in any way affect the work or those employed therein, including but not limited to any special laws or regulations relating to the work or any part thereof;
- .4 that such temporary and permanent work required by the Contract Documents which is to be done by him will be satisfactorily constructed and fit for use for its intended purpose and that such construction will not injure any person, or damage any property;
- .5 that he has carefully examined the Contract Documents and the site of the work and that from his own investigations, he has satisfied himself and made himself familiar with: (1) the nature and location of the work; (2) the character, quality, and quantity of surface and subsurface materials likely to be encountered, including but not limited to, all structures and obstructions on or at the project site, both natural and man-made; (3) the character of equipment and other facilities needed for the performance of the work; (4) the general and local conditions including without limitation its climatic conditions, the availability and cost of labor and the availability and cost of materials, tools, equipment, labor, and professional services necessary to complete the work in the manner required by the Contract Documents; and (6) all other matters or things which could in any manner affect the performance of the work;

- .6 that he will fully comply with all requirements of the Contract Documents;
- .7 that he will perform the work consistent with good workmanship, sound business practice, and in the most expeditious manner consistent with the best interests of the Owner;
- .8 that he will furnish efficient business administration and experienced superintendence and an adequate supply of workmen/women, equipment, tools, and materials at all times;
- .9 that he has carefully reviewed the work required and that the work can be planned and executed in a normal and orderly sequence of work and reasonably scheduled so as to ensure completion of the project in accordance with the Contract Documents, allowing for normal and reasonably foreseeable weather, labor and other delays, interruptions and disruptions of the work;
- .10 that he will complete the work within the contract time and all portions thereof within any required contract deadlines;
- .11 that his contract price is based upon the labor, materials, systems and equipment required by the contract documents, without exception;
- .12 that he will make a good faith effort to utilize minority business enterprises (MBEs) per N.C. Gen. Stat. § 143-128, et seq., and the Owner's policy, as subcontractors for the work; and
- .13 that he and all others acting on his behalf and/or pursuant to a contract with the him have obtained and shall retain throughout the duration of this Agreement all required licenses and certifications required in order to perform the work identified in the Contract Documents, that he will not permit any such licenses or certifications to lapse at any time during the course of his work on this Project, and that he and all others acting on his behalf and/or pursuant to a contract with him are fully licensed and certified to perform all work required by the Contract Documents and this Agreement.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Architect shall be lawfully licensed to practice architecture or shall be an entity lawfully practicing architecture in the jurisdiction where the Project is located. That lawfully-licensed person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 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 and notice, in advance, to the Contractor. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall in its sole discretion employ a successor architect 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 during construction until the date the Architect issues the final Certificate For Payment. The Architect will also be the Owner's representative from time to time during the period for correction of Work. 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 the other provisions of the Contract.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect and Owner will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety

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 Section 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 to the Contractor for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. 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. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Architect.

§ 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.

§ 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. The Architect's action will be taken in accordance with an appropriate submittal schedule approved by the Architect such that the Architect's action will be taken with such reasonable promptness as to cause no delay in the Work or activities of the Owner, Contractor, or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review, or, in the absence of an approved submittal schedule, with reasonable promptness as to cause no delay in the Work or activities of the Owner, Contractor, or separate contractors while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of 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 precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's 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, and 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, including as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion when in the Architect's professional opinion the Work or portion of Work is substantially complete and the date of final completion when in the Architect's professional opinion the Work or portion of the Work is finally complete; 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 required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10 and upon compliance with all other requirements of the Contract Documents.

§ 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 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 in writing or otherwise with reasonable promptness as to cause no delay in the Work or activities of the Owner, Contractor, or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review.

§ 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 the Owner, Contractor and any prime contractors will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

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

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon in writing or otherwise with reasonable promptness as to cause no delay in the Work or activities of the Owner, Contractor, or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

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.

§ 5.2

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, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through 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 Architect shall reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection by the Architect.

§ 5.2.1.1 Notwithstanding Section 5.2.1, the Contractor shall identify in the list of names of the subcontractors proposed, those subcontractors that are minority business enterprises and the date each is planned to begin work on the Project. This list of subcontractors and materials suppliers shall be submitted to the Architect not later than 10 calendar days after the date the Contractor executes the Contract. The Contractor shall not use a different Contractor to perform the work of any subcontractor identified pursuant to this section without providing written notice to the Owner and Architect regarding the reason for the change and only after complying with any requirements in G.S. 143-128.2 to 128.4.

§ 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 If during the duration of the Project the Contractor effects a substitution for any subcontractor per subparagraph 5.2, or if additional subcontract opportunities become available, the Contractor shall make a good faith effort to utilize minority business enterprises. The Contractor shall provide written notification of all new subcontractors.

§ 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.

§ 5.4 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 future obligations under the subcontract, but the Owner does not assume liability for obligations incurred by the Contractor prior to assignment of the subcontract.

§ 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. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall not be legally responsible for any of the successor contractor's obligations under the subcontract.

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 The 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 under Conditions of the Contract identical or substantially similar to these. Failure by the Contractor to make a claim in any way associated with the Owner's right to perform construction and to award separate contracts in accordance with Article 15 shall forever waive the Contractor's right to pursue the claim against the Owner.

§ 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 general contractor/Project Expediter shall provide or designate who shall provide for coordination of the activities of the general contractor'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 general contractor/Project Expediter 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 Project Expediter, Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 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 Project Expediter and Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's 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 Damages and costs caused by delays or by improperly timed activities or defective construction shall be borne by the party responsible therefor. The Contractor shall reimburse the Owner for any costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Contractor shall also reimburse the Owner for any other damages incurred by the Owner as a result of the Contractor's delays, improperly timed activities or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully 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.

§ 6.2.6 In accordance with N.C. Gen. Stat. § 143-128, the Contractor shall be directly liable to the Owner and to the other separate prime contractors for the full performance of all duties and obligations due respectively under the terms of the separate contracts and in accordance with the plans and specifications of the Project.

§ 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 and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible. This provision shall not impose any obligation on the Owner to clean up the site if the Owner is not performing separate construction activities related to the Project.

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, Construction Change Directive 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 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; an order for a minor change in the Work may be issued by the Architect alone with the prior written approval of the Owner.

§ 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, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order 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 The execution of a Change Order by the parties shall represent a final resolution to all issues addressed by the Change Order and shall constitute a waiver of any claim the Contractor may have to additional compensation or any adjustment to the Contract Time. The Owner, however, reserves the right to audit and confirm that the quantity of work performed was equal to the quantity contained in any Change Order in which payment is based upon unit prices or time and materials. The Owner shall be entitled to receive a credit for any overage contained in the Change Order. In order to receive the credit, the Owner must initiate the audit within thirty (30) days of substantial completion of the Project. The Contractors shall provide the Owner with reasonable access to any documents required to conduct the audit.

§ 7.2.3 The methods used in determining adjustments to the Contract Sum shall be the same as noted in Section 7.3.3 below.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to 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.

§ 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; or
- .4 As provided in Section 7.3.7.

§ 7.3.5 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.

§ 7.3.6 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.

§ 7.3.7 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 allowance for overhead and profit in accordance with paragraph 7.3.11 and subparagraphs 7.3.11.1 through 7.3.11.6 below. . 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 the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 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 as confirmed by the Architect. 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 or decrease.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment in amounts not in dispute for Work completed under the Construction Change Directive in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs. For any portion of such cost that remains in dispute, the Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 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 the Architect shall prepare a Change Order accurately recording the agreement. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 In subparagraphs 7.3.6 and 7.3.7, the allowance for the combined overhead and profit included in the total cost to the Owner, including bonds, insurance, bookkeeping, clerical, estimating,

superintendence, project management, and all other indirect or overhead costs shall not exceed the following:

- .1 for the Contractor, for work performed by the Contractor's own forces, 15 percent of the cost;
- .2 for the Contractor, for work performed by the Contractor's subcontractor, 10 percent of the amount due the subcontractor;
- .3 for each subcontractor or sub-subcontractor involved, for work performed by that subcontractor's or sub-subcontractor's own forces, 10 percent of the cost;
- .4 for each subcontractor, for work performed by the subcontractor's sub-subcontractor, 10 percent of the amount due the sub-subcontractor;
- .5 cost to which overhead and profit is to be applied shall be determined in accordance with subparagraph 7.3.7;
- .6 in order to facilitate checking of quotations for extras for credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by complete itemization of costs including labor, materials, and subcontracts utilizing a format approved by the Architect. Labor and materials shall be itemized in the manner described above. Where major cost items are subcontracts, they shall be itemized also. In no case will a change involving over \$100 be approved without such itemization.

§ 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 with the prior written approval of the Owner. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor. The Contractor shall carry out such orders promptly.

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 Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 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 unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents and Contractor's construction schedule, as integrated by the general contractor and as approved by the Architect as to completion date, 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 knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 The time during which the Contractor is delayed in the performance of the work by the acts or omissions of the Owner, Architect or their employees or agents, acts of God, unusually severe and abnormal climatic conditions, fires, floods, epidemics, quarantine restrictions, strikes, riots, civil commotions or freight embargoes, issuance of building permits by authorities having jurisdiction over the Project, or other conditions beyond the Contractor's control and which the Contractor could not reasonably have foreseen and provided against, shall be added to the time for completion of the Work (i.e. the contract time) stated in the Agreement; provided, however, that no claim by the Contractor for an extension of time for delays will be considered or allowed unless made in compliance with the requirements of the Contract Documents, including Article 15 of this Agreement.

§ 8.3.1.1 Should a time extension be granted for substantial completion, an equal extension shall be applied to the date for final completion, unless specifically stated otherwise.

§ 8.3.1.2 Neither the Owner nor the Architect shall be obligated or liable to the Contractor for, and the Contractor hereby expressly waives, any claims against the Owner and the Architect on account of any indirect or direct damages, costs, or expenses of any nature (including extended overhead or additional personnel costs) which the Contractor, its subcontractors, or sub-subcontractors or any other person may incur as a result of any delays, interferences, changes in sequence or the like, which are identified in Section 8.3.1 above or which are reasonable, foreseeable, contemplated, or avoidable by Contractor, arising from or out of any act or omission of any governmental representative (excluding the Owner) or any of the other multiple prime contractors, it being understood and agreed that the Owner's only obligation in any such events shall be an extension of the contract time, but only as determined in accordance with the provisions of the Contract Documents, including Article 15, unless said delay, interference or change in sequence is solely caused by the Owner and/or Architect. Under no circumstances shall the Contractor be entitled to additional compensation from the Owner or Architect for any claim for delays, interferences, changes in sequence or the like, unless said delay, interference or change in sequence is solely caused by the Owner and/or Architect, except under no circumstances shall the Contractor be entitled to additional compensation for lost profits, home office overhead or lost business opportunity.

§8.3.2. Subject to other provisions of the contract, the Contractor may be entitled to an extension of the contract time (but no increase in the contract sum) for delays arising from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, his subcontractors, or suppliers as follows:

.1 labor disputes and strikes (including strikes affecting transportation) that do, in fact, directly and critically affect the progress of the Work; however, and extension of contract time on account of an individual labor strike shall not exceed the number of days of said strike;

.2 acts of God, tornado, fire, hurricane, blizzard, earthquake, typhoon, or flood that damages completed work or stored materials;

.3 abnormal inclement weather; however, the contract time will not be extended due to normal inclement weather. The time for performance of this contract, as stated in the contract documents, includes an allowance for calendar days which may not be available for construction out-of-doors (prior to building dry-in), unless the Contractor can substantiate to the satisfaction of the Owner that there was greater than normal inclement weather considering the full term of the contract time for work to be performed out of doors (prior to building dry-in) using a ten year average of accumulated record mean values from climatological data compiled by the U.S. Department of Commerce National Oceanic and Atmospheric Administration for the locale of the Project and that such alleged greater than normal inclement weather actually delayed the work or portions thereof which had an effect upon the contract time, the Contractor shall only be entitled to an extension of time if the total accumulated number of

calendar days lost due to inclement weather, from the start of work until building dry-in exceeds the total accumulated number to be expected for the same period based on the ten-year average. Time for completion will be extended by the number of calendar days needed to include the excess number of calendar days lost.

.4 Acts of the public enemy, acts of the State, federal, or local government in its sovereign capacity, and acts of another Contractor in the performance of a contract with the Owner relating to the Project.

§ 8.3.3 The burden of proof to substantiate a claim for an extension of the contract time shall rest with the Contractor, including evidence that the cause was beyond his control. The Architect shall base its findings of fact and decision on such justification and supporting evidence and shall advise the Contractor in writing thereof. If the Architect finds that the Contractor was delayed on activities that were on the schedule's critical path, the Architect's determination of the total number of days extension shall be based upon the currently approved progress schedule and on all data relevant to the extension. Such data will be incorporated into the schedule in the form of a revision thereto, accomplished in a timely manner. The Contractor acknowledges and agrees that delays in activities which, according to the schedule, do not affect the contract time of the schedule's critical path, do not have any effect upon the Project's contract time and therefore will not be the basis for an extension of time. The Contractor acknowledges and agrees that time extensions will be granted only to the extent that excusable delays adversely impact critical path activities on the Contractor's schedule. Notwithstanding the above, the Contractor further agrees that if the currently approved schedule is a recovery schedule intended to address delays caused by the Contractor or for which the Contractor was not entitled to an extension of time, the Architect shall be allowed to assess the impact of the delays caused by the Contractor in determining whether the Contractor shall be granted an extension to the contract times.

§ 8.3.4. Extensions in the contract time by Change Orders are subject to an extension-of-time audit by the Owner as follows: (1) The Contractor agrees that, even though the Owner, Contractor, and Architect have previously signed a Change Order containing an extension of time resulting from a change in or addition to the Work that extension in the contract time may be adjusted by an audit after the fact by the Owner. If such an audit is to be made, the Owner must undertake the audit and make a ruling within 30 days after the completion of the Work under the Change Order. (2) The Contractor agrees that any extension of the contract time to which he is entitled arising out of a Change Order undertaken on a force accounting (labor and materials) basis shall be determined by an extension-of-time audit by the Owner or Architect after the work of the Change Order is completed. Such rulings shall be made by the Owner or Architect within 30 days after a request for same is made, except said 30 days will not start until the work under the Change Order is completed.

§ 8.3.5. The Contractor shall not be entitled to and hereby expressly waives any extension of time resulting from any condition or cause unless said claim for extension of time is made in writing to the Architect as required by Article 15.2. Circumstances and activities leading to such claim shall be indicated or referenced in a daily field inspection report for the day(s) affected; otherwise, all such claims are waived by the Contractor. In every such written claim, the Contractor shall provide the following information: (1) nature of delay; (2) date (or anticipated date) of commencement of delay; (3) activities on the progress schedule affected by the delay and/or new activities created by the delay and their relationship with existing activities; (4) identification of person(s) or organization(s) or event(s) responsible for the delay; (5) anticipated extent of the delay; and (6) recommended action to avoid or minimize the delay.

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

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.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values prepared as required under Section 9.2., for completed portions of the Work. Such application shall be notarized 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 shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

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

§ 9.3.1.3 The Owner will retain five percent of the amount of each progress payment on the Project for as long as is authorized by N.C. Gen. Stat. § 143-134.1. At all times during the Project, the Owner shall retain the maximum funds allowed by N.C. Gen. Stat. § 143-134.1. The Owner specifically reserves the right to withhold additional funds as authorized by this Agreement or N.C. Gen. Stat. § 143-134.1.

§ 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 in its sole discretion, 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 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 The Contractor with each application for payment submitted shall include a list of those minority business enterprises subcontractors whose work is included in the application and the amount due each.

By including the minority business enterprises on the list, the contractor certifies that the minority business enterprise performed the work or services or provided supplies under the contract and was not acting as a mere conduit.

§ 9.3.5 The Contractor shall submit with each application for payment documentation in a form acceptable to the Owner showing all sales tax paid by the Contractor for all work and materials covered by the application for payment.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within ten days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, 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 Section 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 observations and evaluation of the Work and the data comprising the Contractor's Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated in the Application for Payment; that the quality of the Work is in accordance with the Contract Documents; and that the Work has been performed in a good workmanlike fashion, subject (1) to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, (2) to results of subsequent tests and inspections required by or performed under the Contract Documents, (3) to correction of minor deviations from the Contract Documents prior to completion, and (4) to specific qualifications expressed by the Architect in the Certificate for Payment. The issuance of a Certificate for Payment will further constitute a representation by the Architect 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 reviewed construction means, methods, techniques, sequences or procedures or 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 another contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

- .7 failure to carry out the Work in accordance with the Contract Documents;
- .8 failure to provide sales tax documentation in accordance with subparagraph 9.3.5;
- .9 failure or refusal of the Contractor to submit the required information on minority business enterprises;
- .10 additional services provided by the Architect pursuant to paragraph 9.6.8; or
- .11 any other reason deemed necessary by the Architect to protect the Owner.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld. No interest shall be added to any amounts withheld pursuant to Article 9.5.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option and in its sole discretion, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment. No interest shall be added to any amounts withheld pursuant to this provision.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner and in accordance with N.C. Gen. Stat. § 143-134.1 the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the 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 and in accordance with N.C. Gen. Stat. § 143-134.1.

§ 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 and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. 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.

§ 9.6.8 The Contractor shall reimburse the Owner or the Owner will retain from the compensation otherwise to be paid to the Contractor funds sufficient to cover the payment of the following additional services performed by the Architect: (1) services required pursuant to the Owner's dispute resolution policy; (2) expense of overtime work requiring higher than regular rates when such work is required due to the failure of the Contractor to perform in accordance with the Contract Documents; (3) review of the Contractor's submittal or shop drawing out of sequence of the submittal schedule agreed to by the

Contractor and Architect; (4) responses to the Contractor's requests for information where such information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior project correspondence or documentation; (5) evaluation of an extensive number of substitutions proposed by the Contractor and making subsequent revisions to instruments of service resulting therefrom; (6) design services related to the default of the Contractor; (7) contract administration services provided 60 days after the date of substantial completion of the work if required due to the Contractor's failure to complete its punchlist work in a timely fashion; (8) more than two inspections or reviews of the same area or areas for the purpose of determining substantial completion of the area or areas; (9) more than two inspection or reviews of the same area or areas for the purpose of determining final completion of the area or areas; and (10) multiple reviews of an incomplete or deficient submittal or shop drawing from the Contractor.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within fourteen days after receipt of the Contractor's Application for Payment, or if the Owner absent just cause does not pay the Contractor within fourteen days after the date established in the Contract Documents the amount certified by the Architect, then the Contractor may, upon fourteen 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, as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Project when the Project or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Project for its intended use.

§ 9.8.2 When the Contractor considers that the Project, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall in good faith prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete the Project in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Project or designated portion thereof is substantially complete. The Architect shall have no obligation to make an inspection to determine whether the Project is substantially complete until the Contractor prepares the Contractor's comprehensive list of items to be completed or corrected prior to final payment. If the Architect determines that the Contractor's list is excessive or through its observations it determines that the Project is not substantially complete, the Architect may require the Contractor to perform additional work prior to the Architect's inspection of the Project. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Project 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 a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When in the Architect's professional opinion the Project 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 Project 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 Project or designated portion thereof unless otherwise provided by the Architect in the Certificate of Substantial Completion. The Architect shall be solely responsible for establishing the date 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 Project or designated portion thereof. Such payment shall be adjusted for instances when the Project is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Project 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 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion of the Project 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 Project and insurance, and have agreed in writing concerning the period for correction of the Project and commencement of warranties required by the Contract Documents. When the Contractor considers a portion of the Project substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Project 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 Project to be used in order to determine and record the condition of the Project.

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

§ 9.9.4 The Owner's partial use or occupancy of the Project shall not be construed as a declaration by the Owner or Architect that the building is substantially complete unless specifically stated in writing by the Owner or Architect. The Owner's partial occupancy or use of the Project shall not prevent the Owner from assessing liquidated damages for the entire Project through the actual date of substantial completion of the Project.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect 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 in his/her professional opinion, and on the basis of the Architect'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 Neither 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, (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 such form as may be designated by the Owner and (6) documentation regarding all of the sales tax paid by the Contractor in such form as may be designated by the Owner. 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.

§ 9.10.3 If, after Substantial Completion of the Project, 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 Project fully completed and accepted. If the remaining balance for the Project or portion thereof not fully completed or corrected is less than retainage stipulated in the Contract Documents, the written consent of surety to payment of the balance due for that portion of the Project 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.

§ 9.10.4 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;
- .4 failure of the work to be performed in a good workmanlike manner;
- .5 conditions not recognized by the Owner at the time of payment; or
- .6 those claims reserved by the Owner at or before the time of payment.

§ 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 in writing by that payee as unsettled at the time of final Application for Payment.

§ 9.10.6 Application for final payment for each prime contract shall be accompanied by executed and notarized copies of AIA Document G706, Contractor's Affidavit of Payment of Debts and Claims, AIA Documents G706A, Contractor's Affidavit of Release of Liens, and AIA Document G707, Consent of Surety Company to Final Payment, and an affidavit that no materials containing asbestos were used on the Project. In addition, each prime contractor shall furnish separate releases or liens from each subcontractor and materials and equipment supplier involved in its portion of the Work.

§ 9.11 LIQUIDATED DAMAGES

§9.11.1 The damages incurred by the Owner due to the Contractor's failure to complete the work within the required contract time, including any extensions thereof, shall be in the amount set forth in the Contract Documents, for each consecutive day beyond the established contract time (Saturdays, Sundays and all holidays included) for which the Contractor shall fail to complete the work. Should the Contractor fail to substantially complete the Project on or before the date stipulated for substantial completion (or such later date as may result from extension of time granted by Owner), he shall pay the Owner, or the Owner will retain as liquidated damages, the sum identified in the Contract Documents for substantial completion for each consecutive calendar day that terms of the contract remain unfulfilled beyond the date allowed by the contract, which sum is agreed upon as a reasonable and proper measure of damages which the Owner will sustain per day by failure of the Contractor to complete the Project within time as stipulated; it being recognized by the Owner and the Contractor that the injury to the Owner which could result from a failure of the Contractor to complete on schedule is uncertain and cannot be computed exactly. In no way shall costs for liquidated damages be construed as a penalty on the Contractor.

§ 9.11.2 For each consecutive calendar day that the Work and/or Project remains incomplete after the date established for final completion, the Contractor shall pay or Owner will retain from the compensation otherwise paid to the Contractor the sum identified in the Contract Documents as final completion liquidated damages for each consecutive day that the Project remains incomplete. This amount is the minimum measure of damages the Owner will sustain due to the delay in the completion of all remedial work, the delay in the correction of deficient work, the disruption to the school and the learning environment, and the inability to use the facilities fully. This amount is in addition to the liquidated damages prescribed above for substantial completion.

§ 9.11.3 If it is determined that the Contractor was delayed at any time in the progress of the work by acts or omissions of the Owner, Architect or their employees or agents and no time extension was granted for the delay, then the Contractor shall not be assessed liquidated damages for any delay caused by the Owner, Architect or their employees or agents.

§ 9.11.4 The liquidated damages set forth in Articles 9.11.1 and 9.11.2 above shall be assessed cumulatively. This provision for liquidated damages does not bar Owner's right to enforce other rights and remedies against Contractor, including but not limited to, specific performance or injunctive relief.

§ 9.11.5 The liquidated damages set forth in Articles 9.11.1 and 9.11.2 above shall not include legal or additional design professional fees that result from termination for cause of the Contractor's contract. If such legal or additional design professional fees are incurred by the Owner, the Contractor shall be liable to the Owner for those costs in addition to the liquidated damages amount set forth above and in the Contract Documents.

§ 9.11.6 The liquidated damages set forth in Articles 9.11.1 and 9.11.2 above shall not include legal or additional design professional costs that are incurred by the Owner in responding to concerns with the Contractor's performance that result in the Owner sending notice of consideration of the termination of the Contractor's contract to the Surety and Contractor. If such legal or additional design professional costs are incurred by the Owner, the Contractor shall be liable to the Owner for those costs in addition to the liquidated damages amount set forth above and in the Contract Documents.

§ 9.11.7 The Owner's entitlement to liquidated damages shall not be considered a "Claim" subject to any time limitation for asserting Claims, but rather accrues automatically upon the Contractor's failure to meet the substantial completion date and/or final completion date.

§ 9.11.8 The Owner's partial use or partial occupancy of the Project shall not be construed as a declaration by the Owner or Architect that the building is substantially or finally complete, unless specifically stated in writing by the Owner or Architect. The Owner's partial occupancy or use of the Project shall not prevent the Owner from assessing liquidated damages for the entire Project through the actual dates of substantial and final completion.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

- .1 employees on the Project and other persons who may be affected thereby;
- .2 the Project and all 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 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 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 explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.4.1 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary, the Contractor shall give the applicable State and local government officials and the Owner reasonable advance notice.

§ 10.2.5 The Contractor shall promptly remedy damage and loss 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 member of the Contractor's organization at the site whose duty shall be the prevention of accidents. 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 permit any part of the construction or site to be loaded so as to cause damage, create an unsafe condition, or create a risk of endangering its safety.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If the Contractor suffers injury or damage to person or property because of an act or omission of the Owner, or of others for whose acts the Owner is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the Owner within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the Owner to investigate the matter.

§ 10.2.9 Contractor acknowledges that he will be performing the Work on a school site and that a construction site might be an “attractive nuisance” which might draw children to said site. Contractor agrees that it will take reasonable precautions necessary to prevent children from entering the construction site or an area where materials are stored.

§ 10.2.10 Contractor and its subcontractors shall not bring any weapons, firearms or alcoholic beverages on any of the Owner’s property.

§ 10.2.11 The Contractor will comply with the Occupational Safety and Health Act of 1970 (OSHA) including all federal and State standards and regulations which have been or shall be promulgated thereunder or in accordance therewith. The Contractor shall be responsible for all citations, assessments, fines, penalties, and delays in the performance of any work on the Project incurred by reason of failure or failure on the part of its agents, employees, assignees or subcontractors to comply. The Contractor shall also comply with all applicable laws, ordinances, rules, regulations, and lawful orders of any public authority having jurisdiction for the safety of persons or property.

§ 10.3 HAZARDOUS MATERIALS

§ 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 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 and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor’s written notice, 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 hazardous material or substance is found to be present, to cause it to be rendered harmless or to verify that it has already been rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect 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 and the Architect 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 either the Contractor or Architect has a reasonable objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have 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. By Change Order, 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.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, and agents and employees of any of them 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 in the affected area after the Owner has been informed in writing of the presence of the material or substance, if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, 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), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor or its subcontractor brings to the site.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and/or negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, unless the cost and expense are due to the Owner's fault or negligence.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or 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' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages shall be written on an occurrence basis and, shall be maintained without interruption from the date of

commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.2.1 Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

- .1 premises operations (including X, C, and U coverages as applicable).
- .2 independent contractor's protective.
- .3 products and completed operations.
- .4 personal injury liability with employment exclusion deleted.
- .5 contractual, including specified provision for Contractor's obligation under Paragraph 3.18.
- .6 owned, non-owned and hired motor vehicles.
- .7 broad form property damage including completed operations.

§ 11.1.2.2 If the general liability coverages are provided by a commercial general liability policy on a claims-made basis, the policy date or retroactive date shall predate the contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in accordance with subparagraph 9.10.2.

§ 11.1.2.3 The insurance required by subparagraph 11.1.1 shall be written for not less than the following limits or greater if required by law:

1. Worker's Compensation:
 - a. State: Statutory
 - b. Applicable Federal: Statutory
 - c. Employer's liability:
 - i. \$100,000 each accident
 - ii. \$1,000,000 disease policy limit
 - iii. \$100,000 disease, each employee
2. Comprehensive or Commercial General Liability
 - a. Limits of Insurance (CSL)
 - i. \$1,000,000 each occurrence
 - ii. \$1,000,000 aggregate
 - b. Products and Completed Operations to be Maintained for One Year After Final Payment
 - i. \$1,000,000 aggregate
 - c. Property Damage Liability Insurance Shall Provide X, C, and U Coverage
 - d. Broad Form Property Damage Coverage Shall Include Completed Operations
3. Contractual Liability (Hold Harmless Coverage):
 - a. Limits of Insurance (CSL):
 - i. \$1,000,000 each occurrence
 - ii. \$1,000,000 aggregate
4. Personal Injury, with Employment Exclusion Deleted: \$1,000,000 aggregate
5. Business Auto Liability (Including Owned, Non-Owned, and Hired Vehicles):
 - a. Limits of Insurance (CLS):
 - i. \$500,000
6. If the General Liability Coverages are Provided by a Commercial Liability Policy, The:
 - a. General aggregates shall be not less than \$1,000,000 and it shall apply, in total, to this Project only;

- b. Fire damage limit shall be not less than \$50,000 on any one fire; and
 - c. Medical expense limit shall be not less than \$5,000 on any one person.
7. Umbrella Excess Liability:
- a. \$1,000,000 over primary insurance;
 - b. \$10,000 retention.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness. If this insurance is written on the comprehensive liability policy, the certificates shall be AIA Document G705, Certificate of Insurance. If this insurance is written on a commercial general liability policy form, accord form 25S will be acceptable.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner as additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.1.5 Each prime contractor shall either require each of his subcontractors to procure and maintain during the life of his subcontract insurance of the types and amounts described in Paragraph 11.1.2.1 above or he shall insure the activities of his subcontractors in his own policy.

§ 11.1.6 The Contractor shall not commence work under this contract until he has obtained all the insurance and bonds required hereunder and such insurance and bonds have been accepted by the Owner. Nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance and bonds required of the subcontractor have been so obtained and accepted. Acceptance of the insurance by the Owner shall not constitute an approval of the insurance as meeting the requirements of the Contract Documents nor relieve or decrease the liability of the Contractor hereunder.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner may purchase and maintain the Owner's usual liability insurance, and the Contractor shall purchase and maintain insurance covering the Owner's contingent liability for claims which may arise from operations under the contract.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has

an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project. The form of policy for this coverage shall be completed value. If the Owner is damaged by failure of the Contractor to maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.1 Property insurance shall be on an “all-risk” or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect’s and Contractor’s services and expenses required as a result of such insured loss.

§ 11.3.1.3 If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Contractor shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner’s option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner’s property due to fire or other hazards, however caused.

§ 11.3.6 Prior to commencement of the Work, the Contractor shall file with the Owner a certificate of insurance for the policy or policies providing the property insurance coverage required for this Project. The certificate of insurance shall contain a provision that the policy will not be cancelled or allowed to expire until at least 30 days prior written notice has been given to the Owner.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect’s consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered and reimbursed by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect’s consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-

subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under this property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Contractor as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Contractor as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Contractor's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Contractor shall deposit in a separate account proceeds so received, which the Contractor shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss due to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Contractor shall furnish bonds satisfactory to the Owner and from a company licensed by the State of North Carolina to issue such bonds covering the faithful performance of the contract and payment of obligations arising thereunder as required by law. The cost of the Contractor's bonds shall be included in the contract sum. The amount of the performance bond and the labor and material payment bonds shall each be equal to 100 percent of the contract sum. These bonds shall be maintained in full force and effect throughout the full term of the contract.

§ 11.4.1.1 The Contractor shall deliver the required bonds to the Owner when he delivers the executed contracts to the Architect, or if the work is to be commenced prior thereto, in response to a letter of intent, the Contractor shall, prior to the commencement of the work, submit evidence satisfactory to the Owner that such bonds will be furnished.

§ 11.4.1.2 The Contractor 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.

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

§ 11.5 INSURANCE COMPANY QUALIFICATIONS

§ 11.5.1 All insurance and bonds required by this contract shall be written by a company or companies having a rating of “A” or above by A.M. Best Company and which are licensed and authorized to do business in North Carolina.

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 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 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 has not specifically requested to examine prior to its being covered, the Architect may, with the consent of the Owner, 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 party responsible 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 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 Sections 3.5 and 12.2.1, if, within one year after the date of Substantial Completion of the Project 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. 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 or its surety 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 or its surety'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 pursuant to Section 12.2, 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. Such adjustment shall be effected whether or not final payment has been made. Any acceptance of nonconforming work must be in writing.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

§ 13.1.1 The Contract shall be governed by the law of the State of North Carolina.

§ 13.1.2 Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein. If, through mistake or otherwise, any such provisions are not inserted or are not correctly or fully inserted, then upon the application of either party, the contract shall forthwith be physically amended to make such insertion.

§ 13.1.3 Whenever possible, each provision of this Agreement shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Agreement, or portion thereof, is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without in any manner invalidating or affecting the remaining provisions of this Agreement or valid portions of such provisions, which are hereby deemed severable.

§ 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 the local board of county commissioners or a lender providing construction financing for the Project, if the party assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 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 thereunder 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 specifically stated in the Contract or as may be specifically agreed in writing.

§ 13.4.3 Each party hereto agrees to do all acts and things and to make, execute and deliver such written instruments, as shall from time to time be reasonably required to carry out the terms and provisions of the Contract Documents.

§ 13.4.4 Any specific requirements in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and are also hereby deemed to include a Subcontractor to any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor's responsibilities or obligations shall not be construed to diminish, abrogate, or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

§ 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 Architect timely notice of when and where tests and inspections are to be made so that the Architect 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 for which applicable laws or regulations expressly prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner 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 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 Architect of when and where tests and inspections are to be made so that the Architect 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, 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.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect 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.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall not bear interest.

§ 13.8 CONDUCT ON SITE

§ 13.8.1 In accordance with N.C. Gen. Stat. § 14-269.2, the Contractor, its subcontractors and employees shall not possess or carry, whether openly or concealed, any gun, rifle, pistol, or explosive on any property owned by the Owner. This includes firearms locked in containers, vehicles or firearm racks within vehicles. The Contractor, its subcontractors and employees shall not cause, encourage or aid a minor, who is less than 18 years old to possess or carry, whether openly or concealed, any weapons on any property owned by the Owner.

§ 13.8.2 The Contractor, its subcontractors and employees, are prohibited from profane, lewd, obscene or offensive conduct or language, including engaging in sexual harassment.

§ 13.8.3 The Contractor and its subcontractors and their employees shall not manufacture, transmit, conspire to transmit, possess, use or be under the influence of any alcoholic or other intoxicating beverage, narcotic drug, hallucinogenic drug, amphetamine, barbiturate, marijuana or anabolic steroids, or possess, use, transmit or conspire to transmit drug paraphernalia on any property owned by the Owner.

§ 13.8.4 The Contractor, its subcontractors and employees shall not solicit from or sell to students or staff within the Owner's facilities or campuses, and shall not give gifts of any value to school system employees.

§ 13.8.5 The Contractor, its subcontractors and employees are prohibited from using access to the site pursuant to this Contract as a means to date, court, or enter into a romantic or sexual relationship with any student enrolled in the Owner's school system. The Contractor agrees to indemnify the Owner for claims against the Owner resulting from relationships which have occurred or may occur between a student and an employee of the Contractor or subcontractor.

§ 13.8.6 The Contractor, its subcontractors and employees shall not interact with any students. However, nothing in this section shall be construed to prevent the Contractor, its subcontractors and employees from taking necessary measures to protect the safety of students, staff, or other employees.

§ 13.8.7 The Contractor shall at all times enforce strict discipline and good order among its employees and shall not employ any unfit person or anyone not skilled in the task assigned to it. The Owner may require the Contractor to remove any employee the Owner deems incompetent, careless or otherwise objectionable.

§ 13.9 COMPLIANCE WITH APPLICABLE LAWS

§ 13.9.1 Lunsford Act/Criminal Background Checks. The Contractor shall conduct at its own expense sexual offender registry checks on each of its owners, employees, agents, or subcontractors ("contractual personnel") who will engage in any service on or delivery of goods to school system property or at a school-system sponsored event, except checks shall not be required for individuals who are solely delivering or picking up equipment, materials, or supplies at: (1) the administrative office or loading dock

of a school; (2) non-school sites; (3) schools closed for renovation; or (4) school construction sites.. The checks shall include at a minimum checks of the State Sex Offender and Public Protection Registration Program, the State Sexually Violent Predator Registration Program, and the National Sex Offender Registry (“the Registries”). For the Contractor’s convenience only, all of the required registry checks may be completed at no cost by accessing the United States Department of Justice Sex Offender Public Website at [http:// www. nsopw.gov/](http://www.nsopw.gov/). The Contractor shall provide certification that the registry checks were conducted on each of its contractual personnel providing services or delivering goods under this Agreement prior to the commencement of such services or the delivery of such goods. The Contractor shall conduct a current initial check of the registries (a check done more than 30 days prior to the date of this Agreement shall not satisfy this contractual obligation). In addition, Contractor agrees to conduct the registry checks and provide a supplemental certification before any additional contractual personnel are used to deliver goods or provide services pursuant to this Agreement. Contractor further agrees to conduct annual registry checks of all contractual personnel and provide annual certifications at each anniversary date of this Agreement. Contractor shall not assign any individual to deliver goods or provide services pursuant to this Agreement if said individual appears on any of the listed registries. Contractor agrees that it will maintain all records and documents necessary to demonstrate that it has conducted a thorough check of the registries as to each contractual personnel, and agrees to provide such records and documents to the school system upon request. Contractor specifically acknowledges that the school system retains the right to audit these records to ensure compliance with this section at any time in the school system’s sole discretion. Failure to comply with the terms of this provision shall be grounds for immediate termination of the Agreement. In addition, the Owner may conduct additional criminal records checks at the Owner’s expense. If the school system exercises this right to conduct additional criminal records checks, Contractor agrees to provide within seven (7) days of request the full name, date of birth, state of residency for the past ten years, and any additional information requested by the school system for all contractual personnel who may deliver goods or perform services under this Agreement. Contractor further agrees that it has an ongoing obligation to provide the school system with the name of any new contractual personnel who may deliver goods or provide services under the Agreement. The Owner reserves the right to prohibit any contractual personnel of Contractor from delivering goods or providing services under this Agreement if the Owner determines, in its sole discretion, that such contractual personnel may pose a threat to the safety or well-being of students, school personnel or others.

§ 13.9.2. Compliance with Applicable Laws. Contractor shall comply with all applicable laws and regulations in providing services under this Agreement. In particular, Contractor shall not employ any individuals to provide services to the Owner who are not authorized by federal law to work in the United States. Contractor represents and warrants that it is aware of and in compliance with the Immigration Reform and Control Act and North Carolina law (Article 2 of Chapter 64 of the North Carolina General Statutes) requiring use of the E-Verify system for employers who employ twenty-five (25) or more employees and that it is and will remain in compliance with these laws at all times while providing services pursuant to this Agreement. Contractor shall also ensure that any of its subcontractors (of any tier) will remain in compliance with these laws at all times while providing subcontracted services in connection with this Agreement. Contractor is responsible for providing affordable health care coverage to all of its full-time employees providing services to the School System. The definitions of “affordable coverage” and “full-time employee” are governed by the Affordable Care Act and accompanying IRS and Treasury Department regulations.

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 in the amount approved by the Architect on a Certificate for Payment within the time stated in the Contract Documents and after an additional 30 days notice to the Owner and Architect and an opportunity to cure; 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 solely 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 fifteen (15) days' written notice to the Owner and Architect and a reasonable opportunity to cure, terminate the Contract and recover from the Owner payment for Work executed prior to the date of termination as allowed in the Contract, including reasonable overhead and profit to the date of termination as allowed in the Contract, and actual and verifiable costs incurred by reason of such termination as allowed in the Contract and proven by the Contractor through valid documentation of such expenses incurred..

§ 14.1.4 If the Work is stopped for a period of 120 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon fourteen (14) additional days' written notice to the Owner and the Architect and an opportunity to cure, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 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 applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority.4 otherwise is guilty of substantial breach of a provision of the Contract Documents;
- .5 refuses or fails to prosecute the work or any separable part thereof with such diligence as will ensure the Substantial or Final Completion of the Work within the Contract Time or fails to complete the Work or remedy a default within said period; or
6. refuses or fails to properly schedule, plan coordinate and execute the Work, as specified herein, so as to perform the Work within the specified milestone and completion dates, or to provide scheduling or related information, revisions and updates as required by the Contract Documents;

7. fails to comply with (1) the provisions of the Sedimentation and Pollution Control Act (N.C. Gen. Stat. §113A-50 *et seq.*), and/or (2) any Notice of Violation issued by the North Carolina Department of Natural Resources.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, 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 Exclude the Contractor from the site and take possession 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, and the Contractor shall reimburse the Owner for any legal or architectural fees incurred by the Owner as a result of the Contractor's default.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's and legal 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 or its Surety. If such costs and damages exceed the unpaid balance, the Contractor or its Surety shall pay the difference to the Owner. The amount to be paid to the Contractor, Surety or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

§14.2.5 If the Owner terminates the whole or any part of the Work pursuant to Section 14.2, the Owner may procure, upon such terms and in such manner as the Owner may deem appropriate, supplies or services similar to those so terminated, and the Contractor shall be liable to the Owner for any excess costs for such similar supplies or services. The Contractor shall continue the performance of the Contract to the extent not terminated hereunder.

§ 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 If a suspension, delay, or interruption ordered by the Owner pursuant to Section 14.3.1 exceeds fourteen consecutive days, an adjustment shall be made 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 in whole or in part 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 to the extent they relate to the Work terminated and enter into no further subcontracts and purchase orders.

§ 14.4.3 If the Owner terminates the whole or any portion of the Work pursuant to Section 14.4, then the Owner shall only be liable to the Contractor for those costs reimbursable to the Contractor in accordance with Section 14.4.4, plus a markup of 10 percent for profit and overhead on the actual fully accounted costs recovered under 14.4.4; provided however, that if there is evidence that the Contractor would have sustained a loss on the entire Contract had it been completed, no profit shall be included or allowed hereunder and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate of loss.

§ 14.4.3.1 After receipt of a Notice of Termination for Convenience, the Contractor shall submit to the Owner its termination claim in the form and with certification prescribed by the Owner. Such claims shall be submitted promptly but in no event later than three (3) months from the effective date of termination, unless one or more extensions in writing are granted by the Owner upon request of the Contractor made in writing within such three (3) month period or authorized extension thereof. However, if the Owner determines that the facts justify such action, it may receive and evaluate any such termination claim at any time after such three (3) month period or any extension thereof. Upon failure of the Contractor to submit its termination claim within the time allowed, the Owner may determine, on the basis of information available to it, the amount, if any, due to the Contractor by reason of the termination.

§14.4.4 If the Owner terminates the whole or any portion of the Work pursuant to Section 14.4, the Owner shall pay the Contractor the amounts determined by the Owner as follows:

- 14.4.4.1 an amount for supplies, services, or property accepted by the Owner pursuant to Subparagraph 14.5.1.6 or sold or acquired pursuant to Subparagraph 14.5.1.7 and not heretofore paid for, and to the extent provided in the Contract such amount shall be equivalent to the aggregate price for such supplies or services computed in accordance with the price or prices specified in the Contract appropriately adjusted for any saving of freight or other charges;
- 14.4.4.2 the total of the cost incurred in the performance of the Work through the date of termination including initial costs and preparatory expense allocable thereto but exclusive of any costs attributable to supplies or services paid or to be paid for under Section 14.4.4.1; and
- 14.4.4.3 Provided, however, that neither the Owner nor the Design Consultant will be liable for payments to subcontractors pursuant to Section 14.4.4.2 unless each subcontractor contains termination provisions identical to those set forth in Article 14. The Owner and the Design Consultant will not be liable to the Contractor or any of its subcontractors for any costs associated with termination if the subcontract of the party involved does not include the proper termination clauses.

§ 14.4.5 In arriving at any amount due the Contractor pursuant to Section 14.4, there shall be deducted the following:

- 14.4.5.1** all unliquidated advance or other payments on account theretofore made to the Contractor applicable to the terminated portion of the Contract;
- 14.4.5.2** any claim which the Owner may have against the Contractor;
- 14.4.5.3** such amount as the Owner determines to be necessary to protect the Owner against loss because of outstanding or potential liens or claims; and
- 14.4.5.4** the agreed price for, or the proceeds of sale of, any materials, supplies or other things acquired by the Contractor or sold pursuant to the provision of Section 14.5.1.7 and not otherwise recovered by or credited to the Owner.

§14.4.6. The total sum to be paid to the Contractor and Section 14.4 shall not exceed the Contract Sum as reduced by the amount of payments otherwise made or to be made for Work not terminated and as otherwise permitted by the Contract. Except for normal spoilage, and except to the extent that the Owner shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Contractor, as provided in Section 14.4.4, the fair value, as determined by the Owner, of property which is destroyed, lost, stolen or damaged so as to become undeliverable to the Owner, or to a buyer pursuant to Section 14.5.1.7

§14.5 GENERAL TERMINATION FOR CONVENIENCE PROVISIONS

§ 14.5.1 After receipt of a notice of termination for convenience from the Owner, pursuant to Section 14.4, and except as otherwise directed by the Owner, the Contractor shall:

§ 14.5.1.1 stop work under the Contract on the date and to the extent specified in the notice of termination;

§14.5.1.2 place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the work under the Contract as is not terminated;

§14.5.1.3 terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination;

§ 14.5.1.4 at the option of the Owner, assign to the Owner in the manner, at the times and to the extent directed by the Owner, all of the rights in the contracts so terminated, in which case the Owner shall have the right, at its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

§ 14.5.1.5 settle all outstanding liabilities and all claims arising out of such termination or orders and subcontracts, with the approval or ratification of the Owner, to the extent it may require, which approval or ratification shall be final for all the purposes of this Article;

§ 14.5.1.6 transfer title and deliver to the entity or entities designated by the Owner, in the manner, at the times and to the extent directed by the Owner to the extent specifically produced or specifically acquired by the Contractor for the performance of such portion of the Work as had been terminated, the following:

- (1)** the fabricated or unfabricated parts, work in process, partially completed supplies and equipment, materials, parts, tools, dies, jigs and other fixtures, completed Work, supplies

- and other material produced as part of, or acquired in connection with the performance of, the Work terminated by the notice of termination; and
- (2) the completed or partially completed plans, drawings, information, releases, manuals and other property related to the Work and which, if the Contract had been completed, would have been required to be furnished to the Owner;

§ 14.5.1.7 use its best efforts to sell, in the manner, at the times, to the extent and at the price or prices directed or authorized by the Owner, any property of the types referred to in Subparagraph 14.5.1.6; provided, however, that the Contractor:

- (1) shall not be required to extend credit to any buyer, and
- (2) may acquire any such property under the conditions prescribed by and at a price or prices approved by the Owner; and provided further that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the Owner to the Contractor under the Contract or shall otherwise be credited to the Contract Sum covered by the Contract or paid in such other manner as the Owner may direct;

§ 14.5.1.8 complete performance of such part of the Work as shall not have been terminated by the notice of termination; and

§ 14.5.1.9 take such action as may be necessary, or as the Owner may direct, for the protection and preservation of the property related to the Contract which is in the possession of the Contractor and in which the Owner has or may acquire an interest.

§ 14.5.2 The Contractor shall, from the effective date of termination until the expiration of three (3) years after final settlement under the Contract, preserve and make available to the Owner, at all reasonable times at the office of the Contractor, but without direct charge to the Owner, all its books, records, documents and other evidence bearing on the costs and expenses of the Contractor under the Contract and relating to the Work terminated hereunder, or, to the extent approved by the Owner, photographs, micro-photographs or other authentic reproductions thereof.

§ 14.5.3 If the termination for convenience, pursuant to Section 14.4, be partial, the Contractor may file with the Owner a claim for an equitable adjustment of the price or prices specified in the Contract relating to the continued portion of the Contract (the portion not terminated by the notice of termination), and such equitable adjustment as may be agreed upon shall be made in such price or prices. Any claim by the Contractor for an equitable adjustment under this Subparagraph must be asserted within three (3) months from the effective date of the notice of termination.

§ 14.5.4 The Contractor shall refund to the Owner any amounts paid by the Owner to the Contractor in excess of costs reimbursable under Section 14.4.

§ 14.5.5 The Contractor shall be entitled to only those damages and that relief from termination by the Owner as specifically provided in Section 14.4.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, adjustment of Contract terms, 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. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 TIME LIMITS ON AND NOTICE OF CLAIMS

Claims by the Contractor must be initiated by written notice to the Owner and the Architect. Claims by the contractor must be initiated 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. The Contractor's failure to submit a claim in accordance with these time limits shall forever waive the Contractor's right to pursue the claim. The Contractor shall indemnify and hold the Owner harmless from any claims by the Contractor's subcontractors arising out of the Contractor's failure to submit the claim in a timely fashion.

§ 15.1.2.1 The resolution of a claim by change order shall finally resolve any and all claims arising from the event giving rise to the claim.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments as requests for payment are substantiated by the Contractor and approved by the Architect. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with his/her exercise of professional judgment and the requirements of the Contract Documents, this Agreement, and AIA Document B101, 2007 Edition, as modified. The Contractor shall not slow or stop the progress of the Work while a claim or dispute is pending or under negotiation.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. The Contractor's failure to provide written notice of the Claim before proceeding to execute the Work shall be grounds for the denial of the Claim by the Architect and/or Owner. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a 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. The Contractor's claim shall specifically show the impact of the delay on the Project's critical path. The Contractor's failure to submit a claim in accordance with the time limits shall forever waive the Contractor's right to pursue the Claim.

§ 15.1.5.2 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 critical path construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14 except it shall not apply to limit the Owner's ability to recover additional architectural and legal fees resulting from a default by the Contractor. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims by the Contractor, including those alleging an error or omission by the Architect but excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Architect for initial decision. The Architect will serve as the Initial Decision Maker. Except for those Claims excluded by this Section 15.2.1, an initial decision by the Architect shall be required as a condition precedent to litigation or mediation of any Claim by the Contractor arising prior to the date final payment is made, unless 30 days have passed after the Claim has been referred to the Architect with no decision having been rendered. The Architect may be granted an extension of time to render a decision by mutual agreement of the parties. The Owner may, in its sole discretion, submit its claims to the Architect for an initial decision before instituting mediation or litigation.

§ 15.2.2 The Architect will review Claims and within ten days of the receipt of a 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.

§ 15.2.3 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 Contractor to authorize retention of such persons at the Contractor's expense.

§ 15.2.4 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 (1) provide a response on the requested supporting data, (2) advise the Architect when the response or supporting data will be furnished or (3) advise the Architect that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Architect will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Architect will render an initial decision approving or rejecting the Claim, or indicating that the Architect is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and/ or litigation.

§ 15.2.7 In the event of a Claim against the Contractor, 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 Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.3 MEDIATION

§ 15.3.2 The parties shall endeavor to resolve their Claims by voluntary mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for voluntary mediation shall be made in writing, delivered to the other party to the Contract.

§ 15.3.3 If the parties voluntarily agree to mediate claims, the parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

NOTE: THESE CONDITIONS SUPERCEDE ANY CONFLICTING CONDITIONS IN THE GENERAL CONDITIONS.

SALES TAX

Itemized sales tax expenditures by the Contractor will be reimbursed to the Owner. BIDS MUST INCLUDE SALES TAX.

DELAYS / CLAIMS

Any contractor whose work is delayed for reasons beyond his control shall immediately notify the Architect as to the nature of the delay, the cause of the delay, and the immediate effect on the project, including cost effects. Verbal notification shall be followed with written notification to the Architect no later than 10 days following the delay; otherwise, no consideration for a claim will be given. For delays claimed by reason of weather, the Contractor shall be required to substantiate such claim by the submission of weather reports for the time period of the delay as well as national weather service reports for the project area for the last ten years, the average of which shall become the basis to determine the validity of such claim. Time extensions granted for reasons of weather or other reasons except as caused by the Owner, with exceptions and time limits for convenience of the Owner as indicated under Section 01011, do not entitle the Contractor to "extended overhead" or "lost profit" recovery.

Delays which do not affect activities on the Critical Path of the approved CPM Construction Schedule will not be considered reason to allow time extensions. Time extensions granted for reasons other than natural weather disasters do not entitle the Contractor to "lost profit" recovery. Time extensions granted for reasons other than natural weather disasters do not entitle the Contractor to "extended overhead" recovery.

CLEAN UP AND PROTECTION OF WORK

The Contractor shall replace any broken glass, remove stains, spots and dirt from decorated work, clean hardware, remove paint spots and smears from all surfaces, clean plumbing fixtures and wash all concrete, and clean and wax resilient tile floors and clean hard tile floors. The Contractor shall be responsible for leaving his work clean in all respects, and shall be responsible for protecting his work from damage by other parties.

CHANGES IN THE WORK

The cost or credit to the Owner resulting from a Change in the work shall be determined as follows:

1. Allowances for overhead and profit combined shall not exceed 15 percent of net cost except when the change involves a Subcontractor, in which case allowances shall not exceed 15 percent for the Subcontractor and 7-1/2 percent for the Prime Contractor.
2. The profit and overhead rates proposed by the Contractor for the initial Change in the Work shall not be changed or modified for the duration of the Contract, and shall apply equally for additive and / or deductive changes.
3. The term "net cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein may include all items of material and labor, the use of power tools and equipment, and such items of cost as Workmen's Compensation Insurance, Social Security and Old Age Benefit, Performance Bond Adjustment and pro-rata charges for foreman. The following items shall be considered as overhead: insurance other than mentioned above, supervision, superintendents, timekeepers, clerks, watchmen, small tools, incidental job burdens and general office expense, and all other items not included in "cost" as above defined.

4. Price requests for changes in the Work furnished to the Architect shall include individual costs for materials, labor, subcontractor work (if applicable), and profit and overhead.

TIME

The Contractor shall fully complete the Work in accordance with the schedule of COMPLETION DATES which are DATES CERTAIN, with no time extensions granted for any reason other than delays caused by the Owner (see below).

WEATHER

Weather is by its nature not "normal", and rain fall varies from year to year. Weather delays are to be accommodated within the schedule as specified, however, "natural disasters", such as caused by severe hurricanes, are excepted. In making his bid, the bidder acknowledges that provisions to accelerate the schedule will be provided as required to meet the scheduled dates, to accommodate abnormal weather conditions, or other delays, except as caused by the Owner.

PROJECT PHASING (note: "Prime" contractor means "sub" contractor under a Single Prime contracting method)

1. The General Contractor is responsible as the project coordinator for all the Prime Contractors. It is the General Contractor's responsibility to schedule the work of all Contractors, to maintain weekly reports to the Architect and the Owner regarding the status of activities of all Contractors, and to submit plans to the Architect and Owner for recovery of any scheduled activity by any Contractor, to the Owner and Architect, for review and immediate implementation.
2. Each Prime Contractor shall be required to coordinate their schedule of activities with the General Contractor, and, in submitting a bid, agree to execute a construction schedule in conformance with the required completion dates. All parts of this schedule will be binding on each Contractor, and it is agreed by all Contractors that liquidated damages will be withheld for any delays caused by them which affect the completion date directly or indirectly, in the sole opinion of the Architect, as further described and defined under the Contract for Construction.
3. All Contractors agree that maintaining the scheduled completion of individual activities is essential for the overall completion of the project schedule, and understand that many activities by other Contractors are dependent on timely completion of their own activities. As such, it is understood and agreed by all Contractors that liquidated damages will be withheld, at the time of delay, for any delays which impact the completion of activities by other Contractors and cause the schedule to be revised to a later completion date. For example, the Sitework Contractor must complete various aspects of sitework in a timely manner to allow the other Prime Contractors to store and stage materials on stoned parking areas, or that finish grading, seeding, mulching, and fertilizing operations shall be completed in a manner which will allow the other Prime Contractors to complete their exterior finish work on time, to provide the project with a completed, full stand of grass on the completion date and not afterwards. As an additional example, General Contractor shall schedule his work and make all provisions to allow the Mechanical Contractor to complete his work in a timely manner to meet his scheduled completion date, which is prior to the General Contractor's completion date, in order for the General Contractor to utilize the HVAC system for conditioning of the building. The foregoing illustrative examples are not intended to imply a listing of issues possible but only to serve as examples.
4. It is understood by all bidders that they will cooperate with each other to formulate and agree on a construction schedule detailing all significant activities of the project within 30 days of award.

COMPLETION DATES (ALL DATES CERTAIN)

The Start Date for the project will be the date of receipt of the Notice to Proceed issued by the Architect.

ON SITE WORK START: MONDAY JUNE 9, 2025

COMPLETE ALL WORK: FRIDAY AUGUST 8, 2025 - The General Contractor shall complete all work and confirm in writing to the Architect that they have completed the Architect's construction review list (liquidated damages incurred).

OCTOBER 8, 2025: General Contractor shall complete any remaining construction review items issued by Architect's (additional liquidated damages incurred).

LIQUIDATED DAMAGES

For each day in excess of the number of days allowed to complete construction under COMPLETION DATES, the Contractor shall pay to the Owner the sum of \$100.00, as liquidated damages reasonably estimated in advance to cover the costs and/or losses incurred by the Owner by the failure of the Contractor to complete the Work of any Phase indicated in the time specified, such time being in the essence of this Contract and a material consideration thereof. Liquidated damages for days in excess of completion date shall be held as retainage from monthly payments by the Owner, and released from subsequent payments only if delay days are made up and no damages have been incurred by the Owner. The Architect shall be the sole judge as to the division of responsibility between the prime contractors, and shall apportion the amount of liquidated damages to be paid by each of them, according to delay caused by any or all of them. Issuance of a Certificate of Occupancy by any Building Official DOES NOT constitute Substantial Completion or completion of construction under this paragraph. Substantial Completion is defined as suitable for use, in the opinion of the Owner and the Architect.

ADDITIONAL LIQUIDATED DAMAGES

For each day in excess of sixty days beyond the date of Substantial Completion that any corrective or incompleting items remain to be done, for each scheduled date, the Contractor shall pay to the Owner the sum of \$100.00, as liquidated damages reasonably estimated in advance to cover the costs and/or losses incurred by the Owner by the failure of the Contractor to complete such corrective work or incomplete items, such time being in the essence of this Contract and a material consideration thereof.

OWNER'S RIGHT TO COMPLETE WORK TO MAINTAIN SCHEDULE

The Contractor agrees that if the Architect determines, at his sole discretion, that the Contractor has repeatedly or persistently failed or refused to implement such measures as will bring the progress of the Work into conformity with the Construction Schedule, then the Owner may contract with others or use the Owner's own forces to perform the Work to bring the progress into conformity with the Construction Schedule. The Contractor agrees that the Owner will be entitled to a set off for the cost thereof including, but not limited to, actual costs, legal fees, and additional overhead costs, which will be charged against the Contract Sum due the Contractor.

PAY APPLICATIONS AND RETAINAGE

Contractor shall submit Applications for Payments to the Architect monthly for work completed and materials stored ending the twenty-fifth day of the month. Retainage shall be five percent (5%) of monthly estimates. The Architect may, at any time after fifty percent of the work has been completed, if he finds that satisfactory progress is being made and with written consent of Contractor's Surety, recommend to the Owner that retainage be reduced to two and one-half percent (2.5%) of monthly estimates.

Sales tax expenditures shall be substantiated with a certified statement by the Contractor and each of his Subcontractors individually showing total purchases of material from each separate vendor and total sales taxes paid each vendor. Certified statement must have the invoice number or numbers covered and inclusive dates of such invoices.

Materials used from Contractor's or Subcontractor's warehouse stock shall be shown in certified statement at warehouse stock prices and amount of tax paid.

The Contractor shall not be required to certify the Sub-Contractor's statements.

The Contractor and each of his Sub-Contractors shall also show purchases of materials from each separate vendor and the cost of same for which no sales tax has been paid.

BUILDERS RISK INSURANCE

Contractor shall provide Builder's Risk Insurance, payable to the Contractor and Owner as their interest may appear upon the entire work and upon all materials in or adjacent thereto which are to be made apart of the work to 100% of the insurable value thereof covering fire, extended coverage, vandalism and Malicious mischief.

END OF SUPPLEMENTARY CONDITIONS

SUMMARY OF WORK

This project involves the furnishing of all labor, materials, and services necessary to complete the construction of the WARREN WILLIAMS SECURITY AND DOOR REPLACEMENT PROJECT, Lee County Schools, North Carolina as shown by the drawings and as specified herein.

CONSTRUCTION SCHEDULE

Each Prime Contractor shall coordinate his work with the others to complete his work, on schedule, within the specified time allowed. Within thirty days of award of Contracts to the successful Bidders, the General Contractor will prepare, with the assistance of each Prime Contractor, a Master Construction Schedule, in both bar chart and critical path method form, which shall be signed by each Contractor and become a requirement and part of the Contract Documents.

The Schedule shall include work by Architect and Owner, as may be required by the contractor (i.e. Critical shop drawing review, color selection, inspections, etc.).

The Master Schedule shall be created in electronic computer form using an industry-recognized "Critical Path Method" software program, and continuously maintained for the benefit and use of all Contractors and the Owner/Architect. The General Contractor shall submit to all parties, at each monthly meeting, printed reports, generated from the computer program file, indicating the current status of all project activities, including those of the other Contractors.

CONTRACTS

Contracts will be executed for each Prime Contractor on AIA Document A101, Standard Form of Agreement Between Owner and Contractor, as amended herein.

PAYMENTS

Payments to the Contractor will be made on the basis of ninety percent (90%) of monthly estimates approved by the Architect.

Bids shall include North Carolina sales and Use Tax or local sales and use tax. The Owner shall be entitled to reimbursement of taxes paid by Contractor on basis shown separately on monthly request for payment. At the time of delivery of the periodic monthly estimate and request for progress payments, the Contractor shall attach to such requests a statement which shall show the amount of sales tax paid by the Contractor upon purchases of building materials during the period covered by the progress payment request. A sworn statement by the Contractor shall be attached stating that the property upon which such sales taxes were paid was or will be used in the performance of the contract. Sales tax on purchases or rental of tools and equipment is taxable to the Contractor and shall not be included in the sworn statement. Refer to Section 01011, Supplementary Conditions, for additional requirements.

CONSTRUCTION PROCEDURES

The following Construction Procedures are to be implemented for this project:

1. The General Contractor shall be the Project Coordinator, and as such shall schedule and manage the entire work. Notify the Architect immediately upon any conflict with separate Prime Contractors.
2. The General Contractor shall coordinate with all Prime Contractors to prepare and submit to the Architect within two weeks following the date of the Notice to Proceed his proposed Progress Schedule for completing the Project in the specified time. Include critical shop drawing reviews, inspections, or other work to be scheduled with Architect or Engineer.

3. Approved Schedule shall be distributed to all other Prime Contractors by the General Contractor. Also, post copy in Contractor's field office. General Contractor shall keep other contractors, including his subcontractors, informed of his planned and actual progress, so that the Project Schedule can be maintained.
4. All other prime and sub-contractors shall organize their work to conform to this Schedule and see that all phases of the work progress as smoothly and efficiently as possible.
5. The General Contractor will coordinate the location of tool sheds and storage areas for all contractors within the limits of the site area designated or approved by the Owner.
6. All Contractors shall submit within twenty (20) days from the date of the Notice to Proceed a complete list of all subcontractors and material suppliers (including addresses), that they propose to use on this Project for Architect's and Engineer's approval.
7. All Contractors are requested to furnish the Architect with the name of their project manager, safety manager, and job foreman or superintendent who will be in charge of the work. These men will not be changed during the course of construction without prior notice to the Architect. Furnish Architect and Owner with name and home telephone number of job superintendent and project manager for emergency contact.
8. Architect will hold monthly meetings at the project site on a day and time to be determined. Each Contractor shall have his job superintendent and project manager present, with the major sub-contractors. The purpose of these meetings is to evaluate progress, resolve problems, and in general to help expedite construction. Meeting representatives must have authority to act on behalf of the Contractor.
9. See Specifications, Division 1, General Requirements, for information relative to the following:
 - a. Schedules and Reports
 - b. Samples and Shop Drawings
 - c. LEED Requirements (THIS IS NOT A LEED PROJECT)
 - d. Temporary Facilities and Controls
 - e. Cleaning Up
 - f. Project Close Out
10. To expedite handling paperwork, the following procedures shall be used:
 - a. Shop drawings and submittals shall be submitted electronically via e-mail, in encrypted format PDFs.
 - b. Each Contractor shall submit to the Architect a cost breakdown of his contract on standard AIA form. Breakdown shall show labor and material. Upon approval by Architect and Engineer, this breakdown shall be used for progress payments.
 - c. Contractor's payment period shall be from the twenty-fifth day of the month to the twenty-fifth day of the following month. Contractor shall forward to the Architect by the first of the following month his Application for Payment in five (5) copies. Owner will make payments by the fifteenth of the month.
 - d. Sales tax expenditures for each pay period shall be substantiated with an attached certified statement by the Contractor and each of his Subcontractors individually

showing total purchases of material from each separate vendor and total sales taxes paid each vendor for the applicable period.

- e. Payment for material stored on site will be approved upon verification of material and quantity. Payment will also be approved if material is stored in a bonded warehouse approved by the Architect and Owner and insured for its full value. Include insurance certificates and certificates verifying storage in bonded warehouse with Application for Payment of such materials.
 - f. Submit copy of Building Permit prior to or with submission of first Pay Application. Payments will be withheld until permit copy is submitted.
11. All materials and submittal data must be approved before Contractor proceeds with installing such items in the Project. All materials requiring color selection shall be submitted together. An incomplete color schedule will not be issued. All material samples must be submitted in order to make a complete, coordinated schedule.
 12. Materials and compaction testing company shall be selected by the Owner. The Architect will notify the Contractor of the company and of the specific testing to be done. Based on these instructions, the Contractor will be responsible for notifying the testing company of individual tests to be made.
 13. Notify Architect, Structural Engineer, and Testing Laboratory twenty-four (24) hours prior to pouring footings. Pours shall always be the maximum that can be properly handled in a day.
 14. Inspection Reports from Architect or Engineers pointing up defective or unacceptable work shall be corrected immediately. Failure to do so will be cause to withhold monthly progress payments.
 15. Each Separate Prime Contractor shall be responsible for removing his own waste material and job debris from the all construction areas and the site, fully coordinated with requirements of the Construction Waste Management Plan (CWMP). This shall be done continually. Failure to keep job site clean and safe for maximum working efficiency will be cause to withhold monthly progress payments. Failure to comply with the Construction Waste Management Plan (CWMP) will be cause to withhold monthly progress payments.
 16. Construction workers will be properly dressed at all times on the site (shirts, shoes, etc.), and the use of foul language, vulgar or lewd gestures, or any other conduct deemed inappropriate by the Owner will be cause for immediate dismissal.
 17. Working Schedule: Working hours shall be coordinated among all Prime Contractors. Advise Owner and Architect.
 18. Claims: Follow General Conditions, as amended, for any claims for additional money or time. Claim must be made at time of discovery, time limits in accordance with these Conditions.
 19. Final Inspection of Projects: It is the Contractor's responsibility to notify the Architect that the project is complete and to submit a list of discrepancies to be corrected. Following such notification, the Architect shall make a preliminary review of the project to verify completion. From the preliminary review, the Architect shall prepare a punch list of discrepancies for the Contractor. Upon notification by the Contractor that the discrepancies have been rectified, the Architect shall schedule a formal final inspection with the Owner.
 20. Record Drawings: One (1) complete set of working drawings will be placed on the job site by the Architect. These drawings will be entrusted to the care of the General Contractor. If any changes or deviations from these drawings are made by any Contractor, such Contractor shall indicate the change on the drawings using colored pencils or ink.

21. Safety Regulations: All Contractors shall abide by current OSHA Regulations at all times. Be advised that the Owner is obligated by these Regulations to report any known violations to OSHA.

22. Smoking is prohibited and not allowed on the construction site property.

DRAWINGS AND SPECIFICATIONS

The following principles shall govern the settlement of disputes which may arise over discrepancies in the contract documents.

1. As between written figures given on drawings and the scale measurements, the figures shall govern.
2. As between large-scale drawings, and small scale drawings, the larger scale drawings shall govern. Discrepancies noted shall be reported to the Architect before commencing work.
3. Where more than one item or procedure is specified or indicated, the Contractor shall provide the item of greatest expense or most stringent procedure.

Titles to divisions and paragraphs in the contract documents are introduced merely for convenience and shall not be taken as a correct or complete segregation of the several units of materials and labor. The Contractor shall see that each subcontractor is familiar with the entire work under this contract to the extent that it affects his portion of the work, as no responsibility is assumed by the Architect for omissions or duplications by the Contractor or his subcontractors due to real or alleged error in arrangement of material in these documents.

The plans and specifications are both a part of this contract and shall be considered cooperative. Any work called for by the plans and not hereinafter specified or vice versa, shall be executed by the Contractor as if specifically mentioned in both.

The drawings and specifications are to be used for this building only and are the property of the Architect; they are to be returned to him before the final certificates are given.

After award of Contract, drawings and specifications shall be obtained and /or downloaded by the General Contractor from the Hite Associates website, www.hiteassoc.com. Additional drawings and / or specifications may be purchased by contacting Speedyblue Reographics at (252) 758-1616, print@speedyblue.com.

INTENT OF DRAWINGS

In making a Proposal, the Contractor acknowledges that the drawings are diagrammatic in nature, and agrees to provide complete and finished construction assemblies to comply with the Architect's intent and pertinent Building Codes, whether all parts or components of such assemblies are shown or not (for example, doors or frames shown on plan drawings but not scheduled or detailed otherwise shall be furnished, consistent with other doors or frames of type and material as would be reasonably inferable, complete with hardware).

STANDARD OF QUALITY, CONTRACT DEFINITION

The Standard of quality for all work shall be first class in all respects, in the opinion of the Project Architect and Project Engineer. In submitting a Bid, the Contractor agrees to abide by this Standard, and no other. Any work considered less than first class by the Architect/Engineer shall be corrected or removed and replaced as directed.

PROJECT MANAGER AND SUPERINTENDENTS, APPROVAL OF PERSONNEL

The Contractor shall provide resumes of proposed Project Manager and Superintendents to Owner, through Architect, for review and approval prior to assignment. Contractor shall submit only those candidates with a minimum of five years experience in the respective capacities proposed, with projects of similar size and scope.

FIELD SUPERVISION REQUIREMENTS

The Contractor is required to provide a full time Field Superintendent to supervise the work of their Contract and to be present, in the field, and not in a field office, at all times work is being performed by that Contractor or his Subcontractors, for the express purpose of providing continuous control of the quality and correctness of construction. In addition, the Contractor's Field Superintendent is required to provide general supervision and coordination of the work of all other Prime Contractors. This person is required to be equipped with a mobile telephone at all times. The Contractor shall issue daily electronic update reports via e-mail.

FIRE RATED CONSTRUCTION ASSEMBLIES

Where U.L., F.M., W.H.I., or other independent testing agency fire rated construction assemblies are referenced on the drawings, it shall be the Contractor's responsibility to meet the specific requirements of the assembly, as defined by State and Local Building Authorities.

MEASUREMENTS AND DIMENSIONS

Before ordering material or doing work which is dependent for proper size or installation upon coordination with building conditions, the Contractor shall verify all dimensions by taking measurements at the building and shall be responsible for the correctness of same. No consideration will be given to any claim based on differences between the actual dimensions and those indicated on the drawings. Any discrepancies between the drawings and/or the specifications and the existing conditions shall be referred to the Architect for adjustment before any work affected thereby is begun.

SAMPLES AND SHOP DRAWINGS

Each Contractor shall submit such samples of materials and examples of workmanship as are requested by the Architect to show quality and kind of material and work he proposes to deliver or perform in executing his contract.

Shop drawings and submittals shall be submitted electronically, in encrypted format PDFs, submitted via e-mail.

Coordinate LEED submittals with general submittal requirements. Refer to Section 01405 LEED Requirements.

Contractors shall make all submittals promptly after award of contract. Submittals requiring color selection shall be made no later than 60 days after award of contract.

All material requiring color selection shall be submitted for review before any colors are selected. The Contractor shall allow 45 days after all submittals are made for the Owner to make selections, and schedule his submittals accordingly.

OWNER SYSTEM TRAINING SESSIONS

Each Contractor shall have factory trained and certified product representatives provide equipment and system training sessions for the Owner for each product and system. Sufficient training shall be provided to the extent that each Owner attendee is fully versed on the product and/or system and can be a designated "trained" participant, and that each participant can demonstrate the ability to operate each product and system in total variety of operations. Provide multiple training sessions if such is required to

be certified as fully trained personnel. An Owner Training Certification is to be provided. Submit an affidavit that each required Owner training session has been performed. Submitted affidavit to include sign-up log of attendees/trainees and description of system or product, cross referenced to the specific contract document.

TEMPORARY FACILITIES

This section covers the furnishing of all appliances, labor, materials, tools, transportation and services required to perform and complete all preliminary work and temporary construction required for the building and site as indicated.

Storage - Each Contractor shall provide such temporary structures as are required for the protection of persons and property. On barricades where necessary, lights shall be maintained at night.

Field Office - General Contractor shall provide and maintain a full time field office construction trailer at the site, equipped with heat, lights, plan desks and telephones. Office shall be sufficient size for use by this Contractor and for on-site meetings with a separate office provided specifically for the Architect's Representatives.

Scaffolds, Tolls, etc. - Each Contractor shall erect and provide all necessary platforms and scaffolds of ample strength required for the handling of materials and equipment such as ladders, horses, poles, planks, ropes, wedges, centers, etc.

Staging: The location of trailers and material storage areas shall be approved by the Architect. Each Prime Contractor will be responsible for repair and testing of the paving base if damaged by his staging activities.

Working Hours: Single or separate prime contractors may set their own working hours, provided, however, that the Project is under supervision by the General Contractor at all times work is being performed.

Sanitation: The General Contractor shall provide and maintain temporary toilets as necessary for use of all workmen. Locate toilets where directed, keep in sanitary condition, and comply with the requirements of the local public health authority.

OSHA

It shall be the responsibility of all contractors to conform to the latest edition of Safety Standards for construction by "OSHA".

CUTTING AND PATCHING

All cutting and patching throughout Project shall be done by the trade requiring the cut. Patching of work or areas affected by cutting, digging and fitting shall be done by mechanics skilled in the applicable trades and shall match surrounding or adjoining similar work. If the quality of the cutting and patching work is not first class and, in the opinion of the Architect, not acceptable, the Contractor will be required to have this work done by the General Contractor, who will be reimbursed for the cost thereof.

CLEANING UP

Each Prime Contractor shall be responsible for keeping the project clean and free of hazardous working conditions. Remove scrap or surplus materials and keep stored materials in a neat and orderly fashion, minimum once weekly.

The General Contractor shall advise all subcontractors and separate prime contractors of their responsibility to keep their part of the project clear and free of accumulated debris.

After completion of Utility Platforms and Main Boiler and Electrical Room construction by all contractors, the General Contractor shall provide a complete vacuuming and wipe down of all mechanical and electrical equipment, including ductwork. The General Contractor shall then provide two coats of clear polyurethane floor sealer as specified to these spaces, after approval of the condition of each space by the Architect.

At the completion of work, the entire project shall be left clean and ready for occupancy. All finished surfaces shall be cleaned, polished, waxed and left in first class condition.

CONSTRUCTION WASTE MANAGEMENT: WASTE AND RECYCLING

The General Contractor shall be responsible for developing and implementing a Construction Waste Management Plan (CWMP) that identifies the materials to be diverted from disposal and their quantities by weight in order to divert a minimum of 75% of all construction and demolition debris. The GC shall submit monthly progress reports indicating quantities disposed and quantities diverted along with each Payment Application. The GC shall also be responsible for providing separate recycling collection containers for disposal and recycling of non hazardous construction and demolition waste. All containers must be clearly labeled with a list of acceptable and unacceptable materials that meet the requirements of the recovery facility or recycling processor, to which the materials shall be hauled. The General Contractor shall provide on site instruction of appropriate separation, handling, and recycling, and return methods to be used by all contractors. These containers shall be maintained on a regular schedule by either the GC or a GC contracted service. If the contracted service provides off-site sorting services, then waste may be commingled on site per the contracted services specifications. If commingling on site is not permitted, then containers are to be provided for the following materials:

1. Concrete waste
2. Brick and CMU (shall be recycled)
3. Wood and Wood Products
4. Cardboard (shall be recycled)
5. Steel and Metals (shall be recycled)

PROJECT CLOSEOUT

Prior to issuance of a Certificate of Final Payment, unless otherwise noted, each Prime Contractor will be required to deliver to the Architect the following items, in encrypted electronic PDF format, indexed with a hyperlinked Table of Contents. All professional seals shall be stamps, not embossed. Files to be submitted on an electronic storage device. All warranties requiring signatures for execution, shall be submitted in paper format.

1. Certificate Of Occupancy issued by the jurisdiction having authority.
2. Fully executed final Change Order, reconciling all project allowances.
3. Submit five copies of Final Application for Payment, AIA Documents and Final Sales Tax Report collated and stapled together.
4. AIA Document G 706/Contractors Affidavit of Payment of Debts and Claims, and AIA Document G 706 A/Contractors Affidavit of Release of Liens, properly executed, notarized, with no exceptions.
5. Consent of Surety to Final Payment.
6. Certificate of Compliance. Each Prime Contractor shall furnish the Architect a certificate, duly notarized, stating that he has constructed his part of the work of the project in complete compliance with the Drawings and Specifications.

7. Each Prime Contractor shall furnish to the Owner through the Architect a certificate, duly notarized, stating that "no hazardous materials, including lead, asbestos, or PCBs, have been used in the work of the Contract".
8. Each Prime Contractor shall furnish to the Owner through the Architect in triplicate, duly notarized, an unconditional Warranty to guarantee his work free from defects in materials and workmanship for a period of one year following Substantial Completion.
9. Operations and Maintenance Manuals indexed, shall be submitted in electronic format with items and sections hyperlinked to the O&M's Table of Contents. Provide paper copies of product warranties.
10. As-Built drawings. Each prime contractor shall deliver to Architect one complete set of as-built drawings. Changes in the work shall be marked in red on a new set of drawings.
11. Transmittal of keys to Principal, acknowledgement signed by Principal, and Finish Hardware Bitting List.
12. Final Color Finishes Schedule.
13. Owner Training Certification: Submit affidavit that each required Owner training session has been performed. Submitted affidavit to include sign-up log of attendees and description of system or product cross referenced to the specific contract document.
14. Process and deliver to the Architect all product guarantees and warranties, materials and testing certificates, etc., as required by various sections within these specifications and by various agencies having jurisdiction over the Work, indexed.

Do not make separate submittals of the above. Incomplete submittals will be returned to the Contractor.

Division 1: GENERAL REQUIREMENTS

Section 01040 – General Requirements and Construction Schedule

- A. Final List of Material Suppliers and Subcontractors with all changes incorporated, (names, addresses, phone numbers, emergency phone numbers)
- B. Final Color Schedule

Section 01050 - Special Conditions for Utilities Construction

- A. Record Drawings of Utilities construction
- B. Copy of all easements with documentation of recording with Register Of Deeds
- C. Sewer system extension work certification by Professional Engineer
- D. Water system extension work certification by Professional Engineer

Division 2: SITE WORK

Section 02281 – Termite Control

- A. 5 year termite control warranty

Section 02713 – Water Mains

- A. Sealed and signed Record Drawings of water mains final installation
- B. Water mains chlorination and bacteriological test results/certifications

Section 02730 – Gravity Sanitary Sewer System

- A. Visual Inspection Certification
- B. Leakage Testing Inspection Certification
- C. Mandrel Deflection Testing Certification
- D. Manhole Testing Certification

Section 02730 – Gravity Sanitary Sewer System

- A. Force Main Testing Certifications

Division 7: THERMAL AND MOISTURE PROTECTION

Section 07218 – Sprayed-On Acoustical Insulation

- A. Manufacturer's asbestos free material certification
- Section 07610 – Metal Roofing
- A. Contractor's 20-year weather tightness warranty
 - B. Manufacturer's 20-year perforation warranty
 - C. Manufacturer's 20-year paint film warranty
 - D. Independent third party inspection report
 - E. Independent third party inspector's qualifications certificate
- Section 07900 – Joint Sealers
- A. 3-year guarantee, workmanship, materials, airtightness, watertightness

Division 8: DOORS AND WINDOWS

- Section 08200 – Wood Doors
- A. Manufacturer's lifetime guarantee
- Section 08210 – FRP Doors and Frames
- A. Manufacturer, contractor and installer's 10-year material and workmanship guarantee
 - B. Affidavit for delivery of adjustment tools and instruction sheets.
 - C. Affidavit for in-service session with Owner
 - D. One year labor warranty for in-service, adjustment tools and instruction sheets
- Section 08410 – Aluminum Swing Entrances
- A. Manufacturer's and installer warranty
 - B. Project record documents
 - C. Operations and maintenance data on installed materials
 - D. Manufacturer's statement of available Field Services upon request
- Section 08418 – Aluminum Storefront Systems
- A. Project record documents
 - B. Manufacturer's 5-year warranty
 - C. Manufacturer's statement of available Field Services upon request
- Section 08500 – Aluminum Windows
- A. Manufacturer's warranty; 2-year window, 5-year glass, 1-year defects
- Section 08700 – Finish Hardware
- A. Affidavit for delivery of tools, instructions and maintenance information.
 - B. Two copies of Job Use Finish Hardware Schedule
 - C. Affidavit certifying in-service sessions performed with Owner
 - D. Affidavit certifying dated appointments with Owner for 6-month Service and Report field visit.
- Section 08800 –Glass and Glazing
- A. 5-year glass leakage and seal guarantee
 - B. One year replacement warranty

Division 9: FINISHES

- Section 09300 – Tile
- A. Affidavit certifying specified extra stock was accepted by the Owner
- Section 09510 – Acoustical Ceilings
- A. Manufacturer's 15-year humidity no-sag warranty
 - B. Affidavit certifying specified extra stock was accepted by the Owner
- Section 09624 – Elastic Vinyl Gymnasium Flooring
- A. Manufacturer's maintenance instructions
 - B. Manufacturer's 15-year wear warranty
 - C. 2-year workmanship and defects warranty
 - D. Affidavit certifying dated appointments with Owner for 1-month Inspection prior to warranty expiration
 - E. Manufacturer/supplier/installer maintenance instructions demonstration
- Section 09650 – Resilient Flooring
- A. Maintenance manuals
 - B. Affidavit certifying specified extra stock was accepted by the Owner
- Section 09656 - Resilient Terrazzo Tile
- A. Manufacturer's maintenance manuals

- B. 20-year wear warranty
 - C. 20-year workmanship and defective material warranty
 - D. Affidavit certifying specified extra stock was accepted by the Owner
- Section 09780 – Carpeting
- A. Lifetime workmanship and material guarantee

Division 10: SPECIALTIES

- Section 10100 – Markerboards, Chalkboards and Tackboards
- A. Lifetime material warranty
- Section 10536 – Awnings and Awning Frames
- A. 5-year loss of strength or color material warranty
- Section 10615 – Demountable Gypsum Panel partitions
- A. Contractor agreement to maintain renovations and additions materials
 - B. Manufacturer’s one year standard warranty
- Section 10655 - Folding partitions
- A. Manufacturer’s one year materials and workmanship warranty
 - B. Affidavit certifying Owner’s demonstrations and training performed
 - C. Maintenance manuals

Division 11: EQUIPMENT

- Section 11200 - Kitchen Equipment
- A. Affidavit certifying manufacturer’s In-Service sessions for all kitchen equipment performed and completed with Owner
 - B. One year parts and labor warranty
 - C. Operations and maintenance manuals
- Section 11450 – Residential Kitchen Equipment
- A. Manufacturer’s standard warranty
- Section 11780 – Video Monitor Mounting Equipment
- A. Mounting bracket 5-year workmanship and materials warranty

Division 12: FURNISHINGS

- Section 12110 – Library and Admin Area Furnishings
- A. Bidders one year workmanship and materials warranty

Division 13: SPECIAL CONSTRUCTION

- Section 13900 – Fire Protection – Wet Pipe System
- A. Bidders one year workmanship and materials warranty

Division 15: MECHANICAL

- Section 15000 - General Provisions for Plumbing and HVAC
- A. Bidders one year workmanship and materials warranty
- Section 15170 - Motors
- A. Commissioning Inspection for vibration, noise, unusual conditions.

Division 15A: PLUMBING

- Section 15200 - Water Supply Systems
- A. Cleaning, primer painted
 - B. Chlorination, County Health Dept Approval
 - C. Pressure Testing
 - D. Verification of proper operation of heat tape
 - E. Pipe and Valve Identification
- Section 15250 - DWV Piping Systems
- A. Pressure Testing
 - B. Video Tape Entire Sanitary Sewer System, with Engineer and Owner representative on site.
- Section 15260 - Kitchen Sanitary DWV
- A. Pressure Testing

- B. Video Tape Entire Sanitary Sewer System, with Engineer and Owner representative on site.
- Section 15400 - Plumbing Fixtures
 - A. Commissioning, adjusting, cleaning, sealing
 - B. Set minimum 6" stream at all EWC.
- Section 15430 - Domestic Water Heaters
 - C. Set T-stats, coordinate EMS control with MC.

Division 15B: HEATING, VENTILATION & AIR CONDITIONING

- Section 15500 - Mechanical Insulation
 - A. Commissioning
 - B. One year from startup not to exceed 24 months, workmanship and materials warranty
- Section 15550 - Boilers & Associated Equipment
 - A. Boiler Certificate of Inspection – NC Department of Labor
 - B. Commissioning
 - C. One year from startup not to exceed 24 months, workmanship and materials warranty
- Section 15630 - Split System Heat Pumps
 - A. One year workmanship and materials warranty, Five year non-prorated compressor warranty
 - B. Provide one year supply of 2" disposable filters
- Section 15635 - Split System A/C Units
 - A. One year workmanship and materials warranty, Five year non-prorated compressor warranty
- Section 15682 - Air-Cooled Rotary Liquid Chiller
 - A. Operation and Maintenance manuals, including startup instructions
 - B. Two days factory trained representative to supervise testing, start-up and instruction on operation and maintenance to owner.
 - C. Provide commissioning Report as outline in specifications.
 - D. Furnish service and maintenance of the complete assembly for one year from Date of Substantial Completion.
 - E. Bidders two year parts and labor, five year warranty on motors, transmission, compressor, not to exceed 72 months from shipping date.
- Section 15730 - Refrigeration Piping System
 - A. Testing, 1½ maximum operating pressure for 24 hours
- Section 15735 - Condensate Piping System
 - A. Testing fill all condensate pans and allow to drain verify no leaks are in the system.
- Section 15740 - Hydronic Piping Systems
 - A. Provide welder's certification
 - B. Identification
- Section 15745 - Water Treatment Systems
 - A. Retest water system prior to 11 month warranty inspection. Make required corrections and submit to report to Architect.
- Section 15750 - Pumps & Hydronic Accessories
 - A. Commissioning
 - B. One day startup and training on operations and maintenance for owner.
 - C. Bidders one year workmanship and materials warranty, not to exceed eighteen months from shipping to the job site.
- Section 15800 - Air Distribution and Accessories
 - A. Clean Duct System per Section
- Section 15955 - Energy Management System
 - A. Commissioning report
 - B. Training
 - C. Additional training for next four years per section.
 - D. Bidders one year workmanship, labor and materials warranty
 - E. Two year warranty on all DDC controllers, valves, and actuators
 - F. 16 hours of on-site adjustment 9 months after Date of substantial completion.
- Section 15963 - Control Valves and Actuator Systems

- A. Commissioning
- B. Bidders two year unconditional warranty
- Section 15966 - Pump Systems Control
 - A. Demonstration per section
 - B. Training per section
 - C. Bidders one year workmanship and materials warranty
- Section 15975 - Electrical Work
 - A. Bidders one year workmanship and materials warranty
- Section 15980 - Testing & Balancing Procedure
 - A. Perform and report activities per section
- Section 15990 - Systems Commissioning
 - A. Maintenance and operations manuals
 - B. Wiring diagrams
 - C. Warranties
 - D. Contact phone numbers and personnel
 - E. Parts Lists
 - F. Instruction and training

Division 16: ELECTRICAL

- Section 16400 – Service and Distribution
 - A. Provide Equipment Identificaiton
- Section 16804 – Fire Alarm
 - A. Test per section
 - B. Instruction as required for operating the system per section
 - C. Installers Certificate
 - D. Bidders one year workmanship and materials warranty
- Section 16900 – Tests and Project Closeout
 - A. Testing per section, include ground resistance tests.
 - B. Two complete sets of as-builts
 - C. Operating and maintenance manuals
 - D. Bidders one year workmanship and materials warranty

Division 17: INTEGRATED TECHNOLOGY SYSTEMS

- Section 17000 - General Provisions
 - A. Provide copies of applicable licenses and permits.
- Section 17100 - Integrated Communications Systems
 - A. Three Copies of operations and maintenance manuals, as built drawings, Single line diagrams.
 - B. Acceptance testing and test reports.
 - C. Bidders one year workmanship and materials warranty
 - D. 120 hours training, refer to section for requirements.
 - E. Factory Certification for 3 Craven County Employees, see section for details, include all required access to reprogramming and customizing system applications to the owner, this includes all licenses, access codes, etc.
- Section 17200 - Data Cabling Systems
 - A. Testing, reports, commissioning testing
 - B. Three sets of Operations and maintenance manuals, as built drawings, single line diagrams.
- Section 17300 - Broadband CATV
 - A. Testing and reports
 - B. Bidders one year workmanship and materials warranty
 - C. Two days training, refer to section for requirements.
- Section 17400 – Security System
 - A. Testing
 - B. Bidders one year workmanship and materials warranty
 - C. Two days training, refer to section for requirements.
- Section 17900 - Tests, Commissioning and Project Closeout

- A. Testing and reports
- B. Bidders one year workmanship and materials warranty except where noted otherwise.
- C. Two notebook sets of instructions, operating and test procedures and parts list.
- D. Two days training, refer to section for requirements.

Do not make separate submittals of the above. Incomplete submittals will be returned to the Contractor.

END OF SECTION

GENERAL

The Base Bid constitutes the primary choice of the Owner with respect to the pertinent specifications for construction, materials, equipment and supplies. The Owner reserves the right to accept or reject any or all Alternates, in any combination with the Base Bid, in accordance with the general provisions of the Contract for Construction.

See Form of Proposal for complete description of Alternates.

END OF SECTION

GENERAL

CASH ALLOWANCES:

The following is a list of cash allowances to be provided in bids. Non-fee items include labor, tax, and freight, except as noted. The Owner reserves the right to bid the work or select subcontractors, or to credit any allowance at full value to remove the work from the Contract.

General Cash Allowance:	Used at Owner Discretion:	\$40,000
	TOTAL	<u>\$40,000</u>

BUILDING PERMITS and all other permit costs shall be determined by Bidders and provided for in Bids.

END OF SECTION

ABBREVIATIONS AND NAMES: The following acronyms or abbreviations as referenced in contract documents are defined to mean the associated names. Both names and addresses are subject to change, and are believed to be, but are not assured to be, accurate and up-to-date as of date of contract documents:

AA	Aluminum Association 818 Connecticut Ave. NW; Washington DC 20006; 202/862-5100
AAMA	Architectural Aluminum Manufacturers Association 35 E. Southern Bldg.; Washington DC 20005; 202/737-4060
AAN	American Association of Nurserymen 230 Southern Bldg.; Washington, DC 20005; 202/737-4060
AASHTO	American Association of State Highway and Transportation Officials 444 North Capital St.; Washington DC 20001; 202/624-5800
AATCC	American Association of Textile Chemists and Colorists P. O. Box 12215; Research Triangle Park, NC 27709; 919/549-8141
ACI	American Concrete Institute P. O. Box 19150; Detroit, MI 48219; 313/532-2600
ACIL	American Council of Independent Laboratories 1725 K St., NW; Washington DC 20006 202/659-3766
ADC	Air Diffusion Council 230 N. Michigan Aven.; Chicago, IL 60601; 312/372-9800
AGA	American Gas Association 1515 Wilson Blvd., Arlington, VA 22209; 703/841-8400
AHAM	Association of Home Appliance Manufacturers 20 N. Wacker Dr.; Chicago, IL 60606 312/984-5800
AI	Asphalt Institute Asphalt Inst. Bldg.; College Park, MD 20740 301/277-4258
AIA	American Institute of Architects 1735 New York Ave., NW; Washington, DC 20006; 202/626-7474
A.I.A.	American Insurance Association 85 John St.; New York, NY 10038;

	212/699-0400
AISC	American Institute of Steel Construction 400 N. Michigan Ave.; Chicago, IL 60611; 312/670-2400
AISI	American Iron and Steel Institute 1000 16th St., NW; Washington, DC 20036; 202/452-7100
AITC	American Institute of Timber Construction 333 W. Hampden Ave.; Englewood, CO 80110; 303/761-3212
AMCA	Air Movement and Control Association 30 W. University Dr.; Arlington Heights, IL 60004; 312/394-0150
ANSI	American National Standards Institute 1430 Broadway; New York, NY 10018; 212/354-3300
APA	American Plywood Association P. O. Box 11700; Tacoma, WA 98411; 206/565-6600
ARI	Air Conditioning and Refrigeration Institute 1815 N. Fort Myer Dr.; Arlington, VA 22209; 703/524-8800
ASC	Adhesive and Sealant Council 1600 Wilson Blvd.; Arlington, VA 22209; 703/841-1112
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers 1791 Tullie Circle, NE; Atlanta, Ga 30329 404/636-8400
ASME	American Society of Mechanical Engineers 345 East 47th St.; New York, NY 10017; 212/705-7722
ASPE	American Society of Plumbing Engineers 15233 Ventura Blvd.; Sherman Oaks, Ca. 91403 213/783-4845
ASSE	American Society of Sanitary Engineering P. O. Box 9712; Bay Village, OH 44140 216/835-3040
ASTM	American Society for Testing and Materials 1916 Race St.; Philadelphia, CA 19103 215/299-5400

AWI	Architectural Woodwork Institute 2310 S. Walter Reed Dr.; Arlington, VA 22206 703/671-9100
AWPA	American Wood-Preserver's Association 7735 Old Georgetown Rd.; Bethesda, MD 20814 301/652-3109
AWPB	American Wood Preservers Bureau P. O. Box 6085; Arlington, VA 22206 703/931-8180
AWS	American Welding Society P. O. Box 351040; Miami, FL 33135 305/642-7090
AWWA	American Water Works Association 6666 W. Quincy Ave., Denver, CO 80235 303/794-7711
BHMA	Builders' Hardware Manufacturers Association (c/o TGAM) 60 East 42nd St.; New York, NY 10017 212/682-8142
BIA	Brick Institute of America 1750 Old Meadow Rd.; McLean, VA. 22102 703/893-4010
CDA	Copper Development Association 405 Lexington Ave.; New York, NY 10174 212/953-7300
CE	Corps of Engineers (U.S. Dept. of the Army) Washington, DC 20314
CFR	Code of Federal Regulations Available from Government Printing Office; Washington, DC 20402 (usually first published in Federal Register)
CISPI	Cast Iron Soil Pipe Institute 1499 Chain Bridge Rd., McLean, VA. 22101 703/827-9177
CRIGLP	CRI Green Label Plus 730 College Drive Dalton, GA 30720 706-278-3176
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Rd., Schamburg, IL 60195 312/372-5059
CS	Commercial Standard of NBS (U.S. Dept. of Commerce)

	Government Printing Office; Washington, DC 20402
DHI	Door and Hardware Institute 7711 Old Springhouse Rd., McLean, VA. 22102 703/556-3990
EIA	Electronic Industries Association 2001 Eye St., NW; Washington, DC 20006 202/457-4900
FAA	Federal Aviation Administration (U. S. Dept. of Transportation) 800 Independence Ave., SW; Washington, DC 20590
FCC	Federal Communications Commission 1919 M St., NW; Washington, D C 20554 202/632-7000
FCI	Fluid Controls Institute U.S. Highway One, Plaza 222; Tequesta, FL 33458; 305/746-6466
FGMA	Flat Glass Marketing Association 3310 Harrison; Topeka, KS 66611; 913/266-7013
FHA	Federal Housing Administration (U. S. Dept. of HUD) 451 - 7th St., SW; Washington, D C 20201
FM	Factory Mutual Engineering Corp. 1151 Boston-Providence Turnpike; Norwood, MA 02062 617/762-4300
FS	Federal Specification (General Services Admin.) Obtain from your Regional GSA Office, or purchase from GSA Specifications Unit (WFSIS); 7th and D Streets, SW; Washington, DC 20406; 202/472-2205 or 2140
FTI	Facing Tile Institute c/o Box 8880; Canton, OH 44711; 216/488-1211
GA	Gypsum Association 1603 Orrington Aven.; Evanston, IL 60201 312/491-1744
HPMA	Hardwood Plywood Manufacturers Association P. O. Box 2789, Reston, VA. 22090 703/435-2900
IEEE	Institute of Electrical and Electronic Engineers, Inc. 345 E. 47th St.; New York, NY 10017; 212/705-790
IESNA	Illuminating Engineering Society of North America

	345 E. 47th St.; New York, NY 10017 212/705-7926
ILI	Indiana Limestone Institute of America Stone City Bank Bldg.; Bedford, IN 47421; 812/275-4425
IRI	Industrial Risk Insurers 85 Woodland St.; Hartford, CT 06102; 203/525-2601
ISA	Instrument Society of America P. O. Box 12277; Research Triangle Park, NC 27709; 919/549-8411
LEED	Leadership in Energy and Environmental Design U. S. Green Building Council 1800 Massachusetts Avenue NW, Suite 300 Washington , DC 20036 (800) 795-1747
MCAA	Mechanical Contractors Association of America 5530 Wisconsin Aven.; Chevy Chase, MD 20815 202/654-7960
MIA	Marble Institute of America 33505 State St.; Farmington, MI 48024 313/476-5558
MIL	Military Standardization Documents (U.S. Dept. of Defense) Naval Publications and Forms Center 5801 Tabor Ave.; Philadelphia, PA 19120
ML/SFA	Metal Lath/Steel Framing Association 221 N. LaSalle St.; Chicago, IL 60601 312/346-1600
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 5203 Leesburg Pike; Falls Church, VA 22041; 703/998-7996
NAAMM	National Association of Architectural Metal Manufacturers 221 N. Lasalle St.; Chicago, IL 60601 312/346-1600
NAPF	National Association of Plastic Fabricators 1701 N. St., NW; Washington, DC 20036; 202/233-2504
NBGQA	National Building Granite Quarries Association c/o H. E. Fletcher Co.; West Chelmsford, MA 01863
NBS	National Bureau of Standards (U.S. Dept. of Commerce) Gaithersburg, MD 20234

	301/921-1000
NCMA	National Concrete Masonry Association P. O. Box 781; Herndon, VA 22070 703/435-4900
NEC	National Electrical Code (by NFPA)
NEII	National Elevator Industry, Inc. 600 Third Aven.; New York, NY 10016 212/986-1545
NECA	National Electrical Contractors Association 7315 Wisconsin Aven.; Bethesda, MD 20814 301/657-3110
NEII	National Elevator Industry, Inc. 600 Third Avenue; New York, NY 10016 212/986-1545
NEMA	National Electrical Manufacturers Association 2101 L St., NW; Washington, DC 20037 202/457-8400
NFPA	National Fire Protection Association Batterymarch Park; Quincy, MA 02269 617/328-9290
NFPA	National Forest Products Association 1619 Massachusetts Aven.; NW; Washington, DC 20036 202/797-5800
NHLA	National Hardwood Lumber Association P. O. box 34518; Memphis, TN 38104; 901/377-1818
NPA	National Particleboard Association 2306 Perkins Pl.; Silver Spring, MD 20910; 301/587-2204
NRCA	National Roofing Contractors Association 8600 Bryn Marr Aven.; Chicago, Il. 60631 312/693-0700
NSF	National Sanitation Foundation P. O. Box 1468; Ann Arbor, MI 48106 313/769-8010
NSSEA	National School Supply and Equipment Association 1500 Wilson Blvd.; Arlington, VA. 22209 703/524-8819
NTMA	National Terrazzo and Mosaic Association 3166 Des Plains Ave.; Des Plains, IL 60018

312/635-7744

NWMA	National Wood Manufacturers Association 205 West Touhy Avenue; Park Ridge, IL 60068; 312/823-6747
OSHA	Occupational Safety Health Administration (U.S.Dept. of Labor) Government Printing Office; Washington, DC 20402
PCI	Prestressed Concrete Institute 20 N. Wacker Dr., Chicago, IL 60606 312/346-4071
PDI	Plumbing and Drainage Institute 5342 Blvd., Pl.; Indianapolis, IN 46208 317/251-5298
PEI	Porcelain Enamel Institute 1911 N. Fort Myer; Arlington, VA 22209 703/527-5257
PS	Product Standard of NBS (U.S. Dept. of Commerce) Government Printing Office; Washington, DC 20402
RFCI	Resilient Floor Covering Institute 1030 15th St.; NW; Washington, DC 20005 202/833-2635
RIS	Redwood Inspection Service (Grading Rules) 627 Montgomery; San Francisco, CA 94111
SAMA	Scientific Apparatus Makers Association 110I 16th St., NW; Washington, DC 20036 202/223-1360
SCAQMD	South Coast Air Quality Management District 21865 Copley Drive Diamond Bar, CA 91765 (909) 396-2000
SDI	Steel Deck Institute P. O. Box 3812; St. Louis, MO 63122 314/965-1741
SDI	Steel Door Institute 712 Lakewood Cnt. N.; Cleveland, OH 44107 216/226-7700
SHLMA	Southern Hardwood Lumber Manufacturers Association 805 Sterick Bld.; Memphis, TN. 38103 901/525-8221
SIGMA	Sealed Insulating Glass Manufacturers Association

	111 E. Wacker Dr.; Chicago, IL. 60601 312/644-6610
SJI	Steel Joist Institute 1703 Parham Rd.; Richmond, VA 23229 804/288-3071
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association P. O. Box 70; Merrifield, VA 22116
SPIB	Southern Pine Inspection Bureau (Grading Rules) 4709 Scenic Hwy.; Pensacola, FL 32504; 904/434-2611
SSPC	Steel Structures Painting Council 4400 5th Avenue; Pittsburgh, PA 15213; 412/578-3327
TCA	Tile Council of America P. O. Box 326, Princeton, NJ 08540; 609/921-7050
TIMA	Thermal Insulation Manufacturers Association 7 Kirby Plaza; Mt. Kisco, NY 10549; 914/241-2284
TPI	Truss Plate Institute 100 W. Church St., Frederick, MD 21701; 301/694-6100
UL	Underwriters Laboratories 333 Pfingsten Rd.; Northbrook, IL 60062; 312/272-8800
WCLIB	West Coast Lumber Inspection Bureau (Grading Rules) P. O. Box 2315; Portland, OR 97223; 503/639-0651
WIC	Woodwork Institute of California 1833 Broadway; Fresno, CA 93773; 209/233-9035
WRI	Wire Reinforcement Institute 7900 Westpark drive; McLean, VA. 22102; 703/790-9790
WSFI	Wood and Synthetic Flooring Institute 2400 E. Devon; Des Plaines, IL 60018; 312/635-7700
WWPA	Western Wood Products Association (Grading Rules) 1500 Yeon Bldg.; Portland, OR 97204; 503/224-3930

WWPA Woven Wire Products Association
 108 W. Lake St.; Chicago, IL 60601;
 312/332-6502

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, and Division 1 specifications that apply to the work specified in this Section.

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

DESCRIPTION OF WORK:

Extent of demolition is shown on the Drawings. Refer to all Drawings and project phasing requirements.

Demolition may require the removal and subsequent off-site disposal of the following, but is not limited to:

- Removal of asphalt or concrete paving, with curb and guttering.

- Removal of building structures and structural elements, complete with foundations – including concrete floors/walks and exterior canopies.

- Removal of building exterior wall and roof components.

- Removal of interior walls and components.

- Removal of partitions and doors.

- Removal of windows and window walls.

- Removal of ceiling systems, floor finishes and wall finishes.

- Removal of underground elements and components; piping and accessories.

- Removal of plumbing, electrical and mechanical equipment.

Cutting concrete floors, masonry walls and ceilings for piping, ducts, and conduit is included with the work of the respective mechanical and electrical Divisions 15 and 16 Specification Sections.

Locating and identification of existing underground utilities.

SUBMITTALS:

Demolition Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's Representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

Incorporate all selective demolition and abatement operations and phases into the Project CPM Schedule.

Coordinate with Owner's continuing occupation of portions of existing building.

JOB CONDITIONS:

Occupancy: Owner will be continuously occupying the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in a manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 72 hours advance notice to Owner of demolition activities which will severely impact Owner's normal operations.

Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

Protections: Provide temporary barricades and other forms of protection as required to protect personnel and general public from injury due to demolition work.

Provide interior and exterior shoring, bracing or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.

Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.

Protect all floors, new or existing, with suitable coverings when necessary. Example: protect flooring finishes from damage from overhead welding or torch work.

Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.

Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to insure that no water leakage or damage occurs to structure or interior areas of existing building.

Remove protections at completion of work.

Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

Explosives: Use of explosives will not be permitted.

Utility Services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

Environmental Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

HAZARDOUS MATERIALS

If necessary, any asbestos abatement will be performed by the Owner's separate prime contractor, with which the General Contractor shall coordinate with. Master project construction schedule shall incorporate abatement operations. Refer to and coordinate with the approved project construction schedule and the Supplementary General Conditions.

LEAD PAINT

If the building is constructed before 1978, all contractors are to assume that all painted surfaces inside the existing building may contain lead paint. The contractors are required to comply with OSHA Lead Construction Standard 29 CFR 1926.62.

All demolition debris can be disposed of at C&D landfill as long as the painted surfaces matrix has not been disturbed. For patching against the painted surfaces and painting, sanding, cutting etc. should be done by company who has received RRP certification for disturbing lead paint in a closed environment where children 6 years of age and under can enter the space during or after the work is completed. Information for RRP certification can be obtained from N. C. Health Hazard Control Unit, Raleigh, NC. Phone No. (919) 707-5950 / Don Chaney at (919) 707-5974.

Lead-Based Paint Renovation, Repair, and Painting: Firms and renovators who perform renovations in housing or child occupied facilities built before 1978 must be certified by the Health Hazards Control Unit (HHCU).

All work shall comply with requirements as published by the EPA Lead-Based Paint Renovation, Repair and Painting Rule in the Code of Federal Regulations.

Samples: For determining whether components are free of lead-based paint, certified renovators may collect paint chip samples and submit samples to a laboratory recognized by NLLAP for analysis. Required paint chip samples documentation shall be prepared and maintained by the certified renovator for three years.

At interior and exterior areas suspected to be or are tested positive for lead based paints, provide vertical containment consisting of a minimum of plastic sheeting or other impermeable material on a rigid frame, or an equivalent system of containing the work area. Vertical containment shall comply with requirements as published by the EPA Lead-Based Paint Renovation, Repair and Painting Rule in the Code of Federal Regulations.

HEPA vacuum cleaners must be designed so that all the air drawn into the machine is expelled through a HEPA filter with no air leaking past or around the filter.

Machines used to remove paint or other surface coatings through high speed operation such as sanding, grinding, power planing, abrasive blasting, or sandblasting, is prohibited on painted surfaces unless such machines have shrouds or containment systems and are equipped with a HEPA vacuum attachment to collect dust and debris at the point of generation. Machines must be operated so that no visible dust or release of air occurs outside the shroud or containment system.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION

INSPECTION:

Prior to commencement of demolition work, inspect areas in which work will be performed. Photograph existing conditions of structure, surfaces, equipment or of surrounding properties which could be

misconstrued as damage resulting from selective demolition work; file with Owner's Representative prior to starting work.

LOCATING EXISTING UNDERGROUND UTILITIES:

Prior to commencement of groundbreaking work, contractor shall provide for and retain a private utilities locating firm. All underground utilities within the construction limits shall be located, marked and identified by the private utility location service, prior to any ground breaking. All information shall be documented in a contractor's As-Built drawings format.

PREPARATION:

Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

Cease operations and notify the Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

Cover and protect furniture, equipment and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.

Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.

Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust-proof partitions of minimum 4" studs, 5/8" drywall (joints taped) on occupied side, 1/2" fire-retardant plywood on demolition side, and fill partition cavity with sound-deadening insulation.

Provide weatherproof closures for exterior openings resulting from demolition work.

Locate, identify, stub off and disconnect utility services that are not indicated to remain.

DEMOLITION:

Perform demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.

Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors or framing.

Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative re-arrange selective demolition schedule as necessary to continue overall job progress without delay.

DISPOSAL OF DEMOLISHED MATERIALS:

The Owner reserves salvage rights to equipment and material, items to be determined at pre-construction conference. At request of the Owner, Contractor shall coordinate the scheduled removal of designated material to be salvaged and place said material outside of building, on site, for removal by Owner.

Remove all debris, rubbish and other materials resulting from demolition operations and not salvaged by the Owner from building site. Transport and legally dispose of materials off-site.

Hazardous materials disposal during demolition operations, shall comply with all applicable regulations, laws, and ordinances, concerning removal, handling and protection against exposure or environmental pollution.

Burning of removed materials is not permitted on project sites.

CLEAN-UP AND REPAIR:

Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.

Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior commencement of demolition work. Repair adjacent construction or surfaces soiled or damaged by demolition work to like new condition.

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, and Division 1 specifications that apply to the work specified in this Section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Extend of site clearing is shown on drawings.

Site clearing work includes, but is not limited to:

- Removal of trees and other vegetation.
- Topsoil stripping and stockpiling.
- Clearing and grubbing.

JOB CONDITIONS:

Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.

Protect improvements on adjoining properties and on Owner's property.

Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

PART 2: PRODUCTS

Not applicable to work of this section.

PART 3: EXECUTION

SITE CLEARING:

General: Remove trees, shrubs, grass and other vegetation, improvements, or obstructions interfering with installation of new construction. Remove such items elsewhere on site or premises as specifically indicated. Removal includes digging out stumps and roots, and backfill with suitable compacted fill material.

Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.

Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

Remove heavy growths of grass from areas before stripping.

Stockpile a quantity of topsoil to allow a full 3" topsoil layer to be redistributed throughout all finish grade areas.

Stockpile topsoil in storage piles in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust.

Dispose of unsuitable or excess topsoil same as waste material, herein specified.

Clearing and Grubbing: Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing.

Removal of Improvements: Remove existing above-grade and below-grade improvements necessary to permit construction, and other work as indicated.

DISPOSAL OF WASTE MATERIALS:

Burning on Owner's Property: Burning is allowed on the Owner's property, with proper permits.

Removal from Owner's Property: Remove waste materials and unsuitable and excess topsoil from Owner's property and dispose of off-site in legal manner.

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, and Division 1 specifications that apply to the work specified in this Section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Extent of earthwork is indicated on drawings.

Earthwork includes all excavation (removal of material) necessary to reach subgrade elevations indicated. This includes subsequent disposal of material. Preparation of subgrade for building pads, parking areas, access roads and storm drainage installation are included as part of this work.

QUALITY ASSURANCE

TESTING AND INSPECTION SERVICE:

All sub-grade and stone base shall be proof-rolled in accordance with NCDOT Standards and as directed by Engineer. Project Engineer shall be present at proof rolling.

CODES AND STANDARDS:

All work conducted as part of this are to be in compliance with NCDOT specifications for Roadway Construction.

SUBMITTALS:

Test Reports-Excavating: Submit following reports directly to Engineer from the testing services, with copy to Contractor:

Field density test reports on all trench backfill located beneath existing or proposed roadways.

JOB CONDITIONS:

Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner and Project Engineer immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.

Provide minimum of 48-hour notice to Engineer, Owner, and Local Government and receive written notice to proceed before interrupting any utility.

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

Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

Operate warning lights as recommended by authorities having jurisdiction.

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

PART 2: PRODUCTS

SOIL MATERIALS

DEFINITIONS:

Satisfactory soil materials are defined as those complying with ASTM D 2487 soil classification groups GW, GP, GM, SM, SW and SP.

Drainage Fill: Washed, evenly graded mixture of crushed No. 57 - Stone.

Select Backfill: Job excavated or borrow material of coarse sands, fine sands or sandy clay mixture.

Backfill Materials: Satisfactory Class I through Class VII soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen material, vegetable and other deleterious matter.

Excavation: Removal of material encountered to subgrade elevations and the reuse or disposal of materials removed. Refer to the following section for additional definitions and classified excavations.

Unauthorized Excavation: Removing materials beyond indicated invert/subgrade elevations or dimensions without direction by the design authority, or Owner. Unauthorized excavations, as well as associated remedial work directed by design authority or Owner, shall be at contractor's expense. Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by design authority.

Subgrade: The uppermost surface of an excavation (after stripping is fully complete) or the top surface of a new fill or backfill immediately below base course, drainage course, walks, drainage fill, slab base materials, or topsoil materials.

Borrow: Suitable soil materials obtained from off-site when sufficient approved soil material is not available from on-site excavations.

Surface Course: The top layer of the pavement structure placed on aggregate base course, asphalt base course, or subgrade, as required.

Aggregate Base Course: Aggregate material layer placed between the subgrade elevation and asphalt paving course, meeting the requirements of Section 910-1, Paragraph (a) of "Standard Specifications for Roads and Structures" by NCDOT.

Bedding Course: Layer placed over excavated subgrade in trench bottoms before laying pipe.

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

Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

UNIT PRICES

Rock Measurement: Volume of rock actually removed, measured in original position, but not exceeding the following:

1. 24 inches outside of concrete forms other than at footings.
2. 12 inches outside of concrete forms at footings.
3. 6 inches outside of minimum required dimensions of concrete cast against grade.
4. 6 inches beneath bottom of concrete slabs-on-grade.
5. 6 inches beneath bottom of footings.
6. 6 inches beneath invert elevation of pipe and/or related structures in trenches, and the greater of 24 inches wider than outside pipe diameter, or 42 inches wide (regardless of trench box sizes). 24 inches wider than related structures in trenches.

Unsuitable Soil Measurement: Volume of unsuitable soil actually removed below subgrade elevations (as recommended and classified by Owner's Geotechnical Testing Firm) measured in-place, but not exceeding the following:

1. 24 inches outside of concrete forms other than at footings.
2. 12 inches outside of concrete forms at footings.
3. 6 inches outside of minimum required dimensions of concrete cast against grade.
4. 12 inches beneath invert elevation of pipe and/or related structures in trenches, and the greater of 24 inches wider than outside pipe diameter, or 42 inches wide (regardless of trench box sizes). 24 inches wider than related structures in trenches.
5. Minimum dimensions as recommended by Owner's Geotechnical Testing Firm in any other areas.

Unit prices for unsuitable soil and rock removal shall include all work and materials as defined in Division 1 Sections, including any required replacement with suitable fill soils or other materials, as required.

Structural Geo-Grids: Integrally Formed Biaxial Geogrid for base reinforcement and subgrade improvement formed with polypropylene polymer in roll form providing positive mechanical interlock. Provide Tensar BX1100 Geogrid.

PART 3: EXECUTION

EXCAVATION CLASSIFICATIONS:

Excavation Classifications: All excavation is classified as General Excavation except for Mass Rock, Trench Rock and Unsuitable Soil Materials as defined in this section.

General Excavation: Excavation, removal and/or disposal of pavements and other obstructions visible on surface, underground structures, utilities, and other items indicated to be demolished and/or removed; together with soil, boulders, and other materials encountered that are not classified as Mass Rock, Trench Rock, Unsuitable Soil, or unauthorized excavation.

- a. Intermittent drilling, ripping or blasting to increase production and not necessary to permit excavation of materials encountered will be considered general excavation.
- b. Soil (irregardless of nature) or other debris encountered above plan subgrade elevations shall be considered general excavation unless determined by the Owner's Geotechnical Testing Firm to meet the definition of Mass Rock.

Unsuitable Soil Excavation: Removal and disposal of soil materials or other debris encountered at or below plan subgrade elevations, which are deemed unsuitable to remain in place by the owner's Geotechnical Testing Firm or design authority.

- a. Soil and/or other debris encountered above plan subgrade shall be considered general excavation.
- b. Soil material which, in the opinion of the Owner's Geotechnical Testing Firm, can be repaired by scarifying, drying or moistening, and recompacting, or material which is made unsuitable by delay of work, lack of protection, inclement weather, or other actions of the Contractor or their Sub-Contractors shall not be considered as unsuitable soil and shall be repaired or replaced by the contractor at no additional cost to the Owner.
- c. Any material moved or removed without the prior classification, measurement and approval by the Owner's Geotechnical Testing Firm or design authority will be considered as general excavation.

Mass Rock Excavation: Removal of a rock formation within an open excavation that (1) is a boulder larger than 1.5 cubic yards in one piece, or (2) cannot be excavated without systematic drilling and blasting. In the event Mass Rock (as defined above) is encountered, the Contractor shall demonstrate (at no additional cost to the owner) to the Owner's Geotechnical Testing Firm that the rock cannot be ripped with equipment equivalent to the following size and performance ratings, without systematic drilling and blasting.

- a. Mass Rock Excavation Equipment: Late-model, track-type tractor rated at not less than 270 hp flywheel power with a draw bar pull of 65,000 lbs at 1 mph in the lowest available gear, and the highest normal operating rpm pulling a sharp, single-toothed shank ripper. The equipment operator should be adequately qualified and experienced with ripping rock with this type equipment.

Trench Rock Excavation: Removal of a rock formation within a trench excavation that (1) is a boulder larger than 1.0 cubic yards in one piece, or (2) cannot be excavated by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling and blasting.

- a. Trench Rock Excavation Equipment: Late-model, track mounted hydraulic excavator equipped with a 42-inch wide (or smaller), short tip-radius bucket with rock teeth; rated at not less than 120-hp flywheel power with a pull of not less than 36,500-lb at a rate of 10 cubic yards per hour. The equipment operator should be adequately qualified and experienced with excavating rock with this type equipment.

Classified Excavation Requirements:

- a. Excavations more than 10 feet in width and pits more than 30 feet in either length or width are defined as open excavations.
- b. Contractor shall expose and clean the surface and any exposed areas of the rock material for classification and measurement (in-place) by the Owner's Geotechnical Testing Firm.
- c. Do not excavate rock or unsuitable soil until it has been classified and measured by the Owner's Geotechnical Testing Firm. Any material moved or removed without the prior classification and measurement by the Owner's Geotechnical Testing Firm will be considered as unclassified excavation.
- d. The Owner or the Owner's Geotechnical Testing Firm shall be the final judge on what is classified as Mass Rock, Trench Rock, or Unsuitable Soils.
- e. The contractor may be required to provide equipment specification data verifying that the above minimum-rated equipment will be used for demonstration purposes. The equipment shall be in good repair and proper working condition. The contractor may be required to provide verification of the equipment operator's qualifications and experience operating the noted equipment for rock removal purposes.
- f. Rippable rock, weathered rock, partially weathered rock, soft rock, or hard overburden soil, which is not classified as Mass Rock or Trench Rock according to the above definitions, shall be considered unclassified excavation.

EXCAVATION AND BACKFILL:

Roadway Excavation: Excavation for the roadways, drives, and parking areas shall conform to the lines, grades, cross sections, and dimensions indicated on the drawings and shall include the excavation of all unsuitable materials from the subgrade. Subgrade shall conform to proposed line, grade and cross-section. This operation shall include any reshaping and wetting or drying required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

Proof Rolling and Undercut Excavation: When excavation has reached required subgrade elevations, provide a proof rolling of the prepared pavement subgrade with a loaded tandem axle dump truck (+25 tons) in the presence of the Owner's Geotechnical Testing Firm. The proof rolling shall be covered by the wheels of the proof rolling vehicle operating at a speed between 2 and 3 miles per hour.

Any areas that rut or pump excessively shall be allowed to dry or shall be undercut and backfilled with select material as directed by the Owner's Geotechnical Testing Firm.

After undercut and backfill operations are complete, a final proof rolling of the undercut areas will be performed in the presence of the Owner's Geotechnical Testing Firm.

Additional Excavation: When excavation has reached required invert/subgrade elevations, notify the Owner's Geotechnical Testing Firm, who will make an inspection of conditions.

Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Remove water to prevent softening of excavation bottoms. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

Excavation for Pavement: Cut surface directly beneath proposed pavement to comply with cross-sections, elevations and grades as shown.

CONTRACTOR IS TO CONTACT NC ONE CALL 48 HOURS PRIOR TO ANY EXCAVATION. CONTRACTOR SHOULD UNDERSTAND THAT ONCE EXISTING UTILITIES ARE LOCATED THAT SAID LOCATION IS VALID ONLY FOR TEN DAYS.

Should it be necessary to cut pavement or otherwise work within a public street, the North Carolina Department of Transportation is to be contacted prior to work, and applicable permits obtained.

TRENCH BACKFILL:

Excavation, bedding, haunching & backfilling shall conform to Section 02210 TRENCHING AND BACKFILLING FOR UTILITIES and Drawings.

Width of trenches at any point below top of pipe shall not be greater than outside diameter of pipe plus 16" for pipes measuring up to 30", and 24" for pipe measuring greater than 30", to permit satisfactory jointing and thorough tamping of bedding material under and around pipe. Care shall be taken not to over-excavate.

Bedding surface for pipe shall provide a firm foundation of uniform density throughout entire length of pipe. Carefully bed pipe in a sand or stone material foundation as specified, that has been accurately shaped and rounded to conform to lowest 1/4 of outside portion of circular pipe, or lower curved portion of pipe arch for entire length of pipe or arch. When necessary, tamp bedding firmly. Bell holes and depressions for joints shall be only of such length, depth, and width as required for properly making particular type joint.

Bed pipe located under pavement or building footprints in a sand or stone material foundation as specified and as indicated on Drawings.

Existing utility lines shall be protected from damage during excavation and backfilling, and, if damaged, shall be repaired by the Contractor at his expense. In the event that the Contractor damages any existing utility lines, he shall report thereof immediately. If it is determined that repairs shall be made by the Contractor, such repairs shall be ordered under terms of other sections of these specifications.

After bedding has been prepared and pipe installed, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6" in compacted depth. Bring backfill up evenly on both sides of pipe for its full length. Care shall be taken to ensure thorough compaction of fill under haunches of pipe. Thoroughly compact each layer to an elevation of at least 12" above top of pipe. Backfill and compact remainder of trench by spreading and rolling, or compact by mechanical rammers or tampers in layers not exceeding 8".

After bedding has been prepared and pipe installed for locations under pavement and building footprints, backfill and compact remainder of trench with selected Type III or IV material from excavation or borrow.

In compacting or rolling or operating heavy equipment parallel with pipe, displacement of or injury to pipe shall be avoided. Any pipe damaged thereby shall be repaired or replaced, at option of Engineer, and at expense of the Contractor.

When fill or backfill is required to be compacted to any specified density factor, tests shall be executed by an approved laboratory to ascertain compliance with requirements, at the expense of the Owner through the established Testing Allowance. One test shall be made for each 50 linear feet of open trench. Cost of laboratory services shall be borne by the Contractor as a part of costs for this section of work for any repeat tests for any specific area which fails to meet requirements.

Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1 degree C).

GENERAL BACKFILL:

Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

In excavations, use satisfactory excavated or borrow material.

Under grassed areas, use satisfactory excavated or borrow material.

Under walks and pavements, use subbase material, or satisfactory excavated or borrow material, or combination of both.

Backfill excavations as promptly as work permits, but not until completion of the following: Inspection, testing, approval, and recording locations of underground utilities.

Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontals so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.

Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content.

Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

COMPACTION:

General: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 698;

Structures, Building Slabs and Steps: Compact each layer of backfill or fill material at 95 % maximum density for cohesive material or 98 % for cohesionless material to within 2' of surface. From 2' deep to finish grade, compact 98% maximum density for cohesive material or 100% relative density for cohesionless materia.

Pavements: Compact each layer of backfill or fill material at 95% maximum dry density to within 6" of surface. From 6" deep to finish grade, compact to 100% maximum density in accordance with AASHTO-T99.

Lawn or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 85% maximum density for cohesive soils and 90% relative density for cohesionless soils.

Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 95% relative density for cohesionless material.

Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

GRADING:

General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

Grade areas as shown on the Drawings to prevent ponding. Finish surface free from irregular surface changes, and as follows:

Lawn or Unpaved Areas: Finish areas to receive a minimum of 3" layer topsoil to within not more than 0.10' above or below required sub-grade elevations.

Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.05' above or below required subgrade elevation.

Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.

Patches in driveways and roadways shall be graded to depth required to match existing pavement or to provide minimum pavement specified.

Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

PAVEMENT SUBBASE COURSE:

General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.

Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12" width of shoulder simultaneously with compacting and rolling of each layer of subbase course.

Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

When a compacted subbase course is shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

FIELD QUALITY CONTROL:

Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

If in opinion of Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

MAINTENANCE:

Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

DISPOSAL OF EXCESS AND WASTE MATERIALS:

Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of off Owner's property.

Comply with and coordinate with the project Construction Waste Management Plan (CWMP).

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1:

DESCRIPTION OF WORK:

The work required is that necessary to conduct the construction in accordance with the requirements the North Carolina Sedimentation Pollution Control Act of 1973 and the rules and regulations promulgated pursuant to the provisions of said act.

Related Work Specified Elsewhere:

Fertilizing, Seeding and Mulching: Section 02480

Codes and Standards: North Carolina Sedimentation Pollution Control Act of 1973 and the Rules and Regulations promulgated pursuant to the provisions of said act.

Local County Soil Erosion and Sedimentation Control Ordinance.

In the event of conflict between the regulations listed above and the requirements of these specifications, the more restrictive requirements shall apply.

PART 2: PRODUCTS

PART 3: EXECUTION

GENERAL:

Construct temporary and permanent erosion control measures as shown on the plans and as directed by the Engineer. All permanent erosion control work shall be incorporated into the project at the earliest practicable time. Temporary erosion control measures shall be coordinated with permanent erosion control measures and all other work on the project to assure economical, effective, and continuous erosion control throughout the construction and post construction period and to minimize siltation of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces, or other property.

The Contractor shall finish grade all disturbed areas and disc the ground surface upon completion of the grading.

The finish grading shall be acceptable to the Owner.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions, and Division-1 Specification sections, apply to work of this section.

GENERAL LANDSCAPE REQUIREMENTS AND ONE YEAR WARRANTY:

Restore all disturbed and damaged lawn finish grading and grassed lawn areas to the like new condition. Irrigate as necessary for establishment and maintenance.

Restore all disturbed and damaged plant beds and plants to the like new condition. Owner shall have final approval of tree and shrubs plantings materials.

Redistribute stockpiled topsoil a minimum of 3" thick layer, to supplement that available for reuse at site.

Provide grown-in turf or sod turf, maintain and warranty complete installation for one year following acceptance.

PRE-EMERGENT HERBICIDE TREATMENT:

Prior to permanent seeding, apply herbicide as recommended by the seed supplier, in accordance with published recommendations.

SEEDING PLAN:

PERMANENT SEEDING AFTER APRIL 15 AND BEFORE SEPTEMBER 15:

Seeding Mixture:

1. Centipede, applied at the rate of 10 lbs. Per acre.
2. Common Bermuda, applied at the rate of 100 lbs. Per acre.

PERMANENT SEEDING AFTER SEPTEMBER 15 AND BEFORE APRIL 15:

Seeding Mixture:

1. Centipede, applied at the rate of 10 lbs. Per acre.
2. Common Bermuda (unhulled), applied at the rate of 100 lbs. Per acre.
3. Annual Rye Grass, applied at the rate of 50 lb. Per acre.

SOD:

Provide centipede sod where indicated on Drawings.

SOIL AMENDMENTS

Apply 3000 lb. / acre ground agricultural limestone and 1,000 lb. / acre of 10-10-10 fertilizer.

MULCH

Use jute, excelsior matting, or other effective channel lining material to cover the bottom of channels, ditches, and swales as required to prevent erosion, and promote turf establishment. Extend lining above the highest calculated depth of flow. On channel side slopes above this height, and in drainages not requiring temporary lining, apply 4000 lb. / acre grain straw by stapling netting over the top.

All other lawn areas shall be mulched with 2,000 lb. / acre grain straw. Stitched mulch into ground with a disc harrow with blades set straight.

Provide matting for sloped banks as indicated on Drawings.

TURF ESTABLISHMENT, MAINTENANCE, AND SPECIAL RIGHT OF OWNER TO TAKE CORRECTIVE ACTION

Turf establishment and maintenance includes sufficient irrigation and frequent mowing to promote turf grow-in and to prevent the growth and proliferation of weeds. In addition, the contractor shall re-seed, re-fertilize and mulch immediately following erosion or other damage, which is to be expected. Should the Owner determine that the grounds in part or as a whole lack proper maintenance in accordance with this paragraph, the Owner or his designated agent (the Architect or Engineer) may provide written notice to the Contractor to take corrective action. If the Contractor does not respond with corrective action or otherwise in an acceptable manner to the Owner within five (5) calendar days, the Owner may, at his option, undertake such corrective action with his own or other forces, and deduct the full cost from the Contract amount of the Contractor.

PLANTING GENERAL LAWNS:

Where topsoil has been stripped, redistribute a minimum 3" layer of stockpiled topsoil, add specified soil amendments and mix thoroughly into top 4" of soil, tilling surface to a level, fine texture.

Cultivate to a depth of 6" in areas where topsoil has not been stripped, add specified soil amendments and mix thoroughly into top 4" of soil, tilling surface to a level, fine texture.

Grade and roll prepared lawn surface. Water thoroughly but do not create muddy soil condition.

Hydro-seed uniformly in two directions in the quantity recommended by the seed producer. Water thoroughly with fine spray.

Protect seeded areas against erosion by stitching straw with a disc harrow with blades set straight. Immediately after seeding, protect the area against traffic or other use by erecting barricades as required until final acceptance.

Install sodding where indicated on Drawings. Irrigate as necessary for establishment and maintenance.

LANDSCAPE MATERIALS AND PLANTING:

Comply with detailed drawings and the AMERICAN STANDARD FOR NURSERY STOCK, ANSI Z60.1-1990. Plant materials shall be checked upon delivery to site and before planting in accordance with this standard, and any materials that do not meet specifications will be removed from the site. The contractor shall replace any dead or dying plant materials, or those failing to thrive, that are observed, following acceptance of 12 months install by Owner.

FINAL ACCEPTANCE:

Final Inspection and Acceptance: At the end of the turf establishment period, final inspection will be made upon written request at least 10 days prior to the anticipated date. Final acceptance will be based upon a full stand of turf of the species specified.

Turf establishment period shall be defined as minimum three mowing cycles, or as required to produce a stand of turf. Contractor is responsible for irrigation and mowing as required.

Re-planting: In areas which do not have a satisfactory stand of turf or sod, replace sod or replant seeding, mulch, re-fertilize and irrigate within specified planting dates.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Extent of portland cement concrete paving includes concrete sidewalks, curbs and gutters, as shown on Drawings.

Prepared subbase is specified in Section 02200.

Concrete and related materials are specified in Section 03200.

QUALITY ASSURANCE:

Codes and Standards: Comply with NCDOT Regulations if more stringent than herein specified.

SUBMITTALS:

Furnish samples, manufacturer's product data, test reports, and materials' certifications as required in referenced sections for concrete and joint fillers and sealers.

Install sample section of concrete sidewalk for review and approval by Architect. Mockup sample to include full construction features required by Drawings, including expansion joints and sealants, and control joints.

JOB CONDITIONS:

Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

Utilize flagmen, barricades, warning signs and warning lights as required.

PART 2: PRODUCTS

MATERIALS:

Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

Use flexible spring steel forms or laminated boards to form radius bends as required.

Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

Concrete Materials: Comply with requirements of applicable Division - 3 Sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.

Welded Steel Wire Fabric: ASTM A185 Plain Type; in flat sheets; unfinished. Rolled WWF shall not be acceptable for use on this job.

Expansion Joint Materials: Bituminous Fiber, 1/2" thick, complying with NCDOT Spec. Section 928-1 and Section 420-12.

Liquid-Membrane Forming Curing Compound: Complying with ASTM C 309, Type I, Class A unless other type acceptable to Engineer. Moisture loss not more than 0.055 gr. / sq. cm. when applied at 200 sq. ft. / gal.

Detectable Tactile Warning Surfaces: Vitrified polymer composite panels, cast into concrete. Dark color. "Armor-Tile" as manufactured by Engineered Plastics or equivalent. Comply with all ADA and NC Accessibility code requirements.

CONCRETE MIX, DESIGN AND TESTING:

Comply with requirements of applicable Division - 3 Sections for concrete mix design, sampling and testing, and quality control, and as herein specified.

Design mix to produce normal-weight concrete consisting of portland cement, aggregate, water-reducing or high-range water-reducing admixture (super - plasticizer), air-entraining admixture and water to produce the following properties:

Compressive Strength: 3,000 psi, minimum at 28 days, unless otherwise indicated.

Slump Range: Not greater than 4".

Air Content: 5 % - 8%.

PART 3: EXECUTION

SUBSURFACE PREPARATION:

Remove loose material from compacted subbase surface immediately before placing aggregate base course. No aggregate base course shall be placed until the foundation has been inspected and approved by the Engineer. Proof-rolling may be required depending on condition of subbase.

Place aggregate base course material on prepared subgrade in layers of uniform thickness. Grade the base course evenly to thickness indicated on drawings and compact before placing concrete.

FORM CONSTRUCTION:

Set forms to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 2 hours after concrete placement.

Check completed formwork for grade and alignment to following tolerances:

Top of forms not more than 1 / 8" in 10'.

Vertical face on longitudinal axis, not more than 1/4" in 10'.

Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

REINFORCING

Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions, including load bearing pads.

CONCRETE PLACEMENT:

General: Comply with requirements of Division - 3 Sections for mixing and placing concrete, and as herein specified.

Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent discoloration of reinforcing, dowels, and joint devices.

Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2-hour, place a construction joint.

Drop top of curb as shown in details of plans at all radii of intersections, to allow construction of handicapped ramps and sidewalks.

Curbs and Gutters: Automatic machine may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross-section, lines, grades finish, and jointing as specified.

JOINTS:

General: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

Exterior Concreted Walks: Provide all concrete walk surfaces with a concrete walk 1/2" tooled expansion joints at 30' centers maximum and sawcut weakened-plane (contraction) joints at 5' centers maximum. Pour sample for Architect approval.

Weakened-Plane (Contraction) Joints: Provide sawcut weakened-plane (contraction) joints, sectioning concrete sidewalks at 5' intervals. Sawcut weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows:

Sawcut joints at concrete walks as soon as concrete has sufficient strength to prevent spalling of the joint due to the action of the saw. But in no case greater than 4 hours after initial placement of the concrete. Concrete walk sawcut joints shall not be filled with joint filler.

Tooled Joints: Form tooled joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer. Remove tooling marks.

Construction Joints: Place tooled construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2-hour, except where such placements terminate at expansion joints.

Construct joints as shown or, if not shown, use standard metal keyway-section forms.

Locate expansion joints at 90' o.c. for each curb and gutter section and 30' o.c. for each sidewalk section unless otherwise indicated, and at beginning and end of all curb and gutter radii. Connections with rigid objects including existing curb and gutter and catch basins.

Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or slip joint filler sections together.

Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

Fillers and Sealants: Comply with manufacturer's requirements for preparation of joints, materials installation, and performance. Place at all curb and gutter template joints, curb-to-walk transition joints, concrete walk expansion joints, tooled concrete walk construction joints. Joint filler not required at 5' O.C. sawcut weakened-plane contraction joints.

CONCRETE FINISHING:

After striking-off and consolidating concrete, smooth surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

After floating, test surface for trueness with a 10' straight edge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:

Provide all concrete walk surfaces with a unidirectional fine broom finish. Pour sample for Architect approval.

Broom Finish, by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Engineer.

Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honey combed areas. Remove and replace areas or sections with major defects, as directed by Engineer.

CURING:

Protect and cure finished concrete paving, complying with applicable requirements of Division - 3 Sections. Use membrane-forming curing and sealing compound or approved moist-curing methods.

REPAIRS AND PROTECTIONS:

Repair or replace broken or defective concrete, as directed by Engineer.

Drill test cores where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

Sweep concrete and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

END OF SECTION

RELATED DOCUMENTS

The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.

PART 1 - GENERAL

RELATED WORK SPECIFIED ELSEWHERE:

Section 02200 Earthwork

DESCRIPTION OF WORK:

The extent of storm sewer collection system work and materials required are shown on drawings.

Storm Sewer collection system may include, in complete assemblies, but is not limited to, all of the following:

- Dual Wall HDPE Pipe
- Storm sewer pipe, RCP and PVC.
- PVC Plastic Structures for Underground Drainage Piping System.
- Trench Drains
- Rip Rap.
- Catch basins / Manholes

QUALITY ASSURANCE:

CODE AND STANDARDS: Comply with applicable requirements of NCDOT.

SUBMITTALS:

Shop Drawings, Storm Sewer System: Submit shop drawings for the system, including details of underground structures, metal accessories, fittings, and connections, and any variations from those details shown on the drawings.

MATERIAL CERTIFICATES: Provide material certificates signed by the material manufacturer and Contractor for all pipe manhole, catch basins, frames and grates indicating each complies with specifications.

PART 2 - PRODUCTS

CONDUIT MATERIALS:

Dual Wall HDPE Pipe: Corrugated, smooth interior, high-density polyethylene (HDPE) pipe, with ASTM D3212 water-tight reinforced integral bell & gasketed spigot jointing. Pipe and fittings shall comply with AASHTO M252 Type S, AASHTO M294 Type S, ASTM F2306.

Polyvinyl Chloride (PVC) Pipe: PVC pipe shall conform to the requirements of ASTM D3034 (SDR35). Joints and fabricated fittings shall be glued hub joints and shall be assembled in accordance with the pipe manufacturer's recommendations and Specification D3212. Minimum cell class shall be 12454B. PVC pipe shall be supplied in 13.0 foot lengths.

Reinforced Concreted Pipe (RCP):

RCP shall be of tongue and groove construction in accordance with ASTM C-76, Class III. All pipe shall be stamped by supplier - "R. C.". Joint material shall be ConSeal CS-102 Butyl Rubber Sealant gasket, or ConSeal CS-202 Butyl Rubber Sealant gasket conforming to ASTM C 990, and Federal Specification SS-S-210.

TRENCH DRAINS:

Provide vehicle traffic grade Trench Drains where indicated. Provide polymer concrete products equal to ACO Drain K100S complete with heavy duty ductile iron gratings locked down with quick locking bolt and bar type lockings as manufactured by ACO Polymer Products.

Provide general purpose grade Trench Drains designed for use in concrete slab applications where indicated. Provide fiberglass channel products equal to ACO Drain FG100 complete with Load Class B, ADA rated, perforated galvanized steel gratings, locked down with quick locking bolt and bar type lockings as manufactured by ACO Polymer Products.

PVC DRAIN BASINS and INLINE DRAINS:

Provide vehicle traffic grade Drain Basins and Inline Drains where indicated shall be PVC with heavy duty ductile iron grates. Products equal to Nyloplast by Advanced Drainage Systems.

CONCRETE MANHOLES:

General: Manholes and Catchbasins shall be precast concrete where indicated. Manholes not of a conventional size may be of concrete block or brick.

Precast Concrete Manholes: Shall comply with ASTM C-478, sized as indicated, with an eccentric cone, precast top, precast bottom and O-Ring joint conforming to ASTM C 493, or RAM-NEK Preformed Plastic Gasket.

Interior diameter of precast manholes shall be based upon pipe size as follows unless otherwise indicated:

<u>Pipe Size</u>	<u>Interior Diameter</u>
Less than 24"	4'
24" - 30"	5'
Larger than 30"	6'

MASONRY MATERIALS:

Concrete Masonry Units (Manhole Block): ASTM C 139.

Manhole Drop Inlet and Catch Basin Brick: ASTM C 32, Grade MS.

Concrete Brick: ASTM C 55, Grade NI.

Masonry Mortar: ASTM C 270, Type M, approximately 1:1 / 4:2 Portland Cement, lime, sand.

Concrete Block: ASTM C 90, Grade NI.

For minor amounts of mortar, packaged materials complying with ASTM C 387, Type M, will be acceptable.

Plasticizing Agent: Omicron or equal. Use in accordance with manufacturer's instructions.

ACCESSORIES:

General: All metal accessories for manholes, catch basins and drop inlets shall be gray cast iron, ASTM A 48, Class 30B. Frames, grates and covers shall be factory coated with an asphalt base paint. Install metal accessories as shown on the drawings.

Rip Rap: Rip rap shall be accomplished in accordance with Section 868 of the N. C. State Highway Specifications for Roads and Structures. Rip rap shall be located and be of the class shown on plans.

Filter Cloth: Filter cloth shall be composed of strong rot proof synthetic fibers formed into a fabric shall be free of any treatment or coating which might significantly alter its physical properties after installation. The filter cloth shall have a puncture strength to withstand a minimum force of 100 lbs., in accordance with ASTM D 751. Filter cloth as manufactured by Monsanto, Carthage Mills, Inc., or approved equal will be acceptable.

Downspout Transition Boots: Downspout transition boot fitting for each downspout shall be a PVC Sewer Solvent Weld Downspout Adaptor, sized for 4"x4" downspout transition to the underground leader pipe size indicated. Provide an SDR 35 fitting, meeting ASTM D-2729, and ASTM D-3034 requirements, utilizing solvent welded connection to SDR 35 PVC pipe leaders. As manufactured or distributed by Ferguson, Genova, NDS or equivalent.

Flexible Downspout Transition Boots: Downspout pipe or roof drain leader pipe transition boot fittings for each existing downspout shall be a flexible elastomeric PVC Sewer Downspout Adaptor, sized for existing downspout pipe transition to the new underground leader pipe size indicated. Provide a flexible PVC fitting, meeting ASTM D-2729, and ASTM D-3034 requirements, utilizing 300 series stainless steel pipe clamp connections to new underground pipe leaders. As manufactured or distributed by Ferguson, Genova, NDS or equivalent.

Field examine existing downspout or roof drain leader pipes to determine exact pipe and fitting sizes, and provide the couplings, reducers, connectors, or elbows to suit the condition required for complete transitions.

PART 3 - EXECUTION

INSPECTION:

Contractor must examine the areas and conditions under which storm sewer system work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

INSTALLATION OF CONDUIT (PIPE):

General:

Perform excavation, trenching, bedding, haunching and backfilling as specified in appropriate Division 2 Sections. Conduct backfill operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed.

Pipe bedding, haunching and backfilling layers shall be in accordance with requirements set forth on Drawings, and in Section 02210, TRENCHING AND BACKFILLING FOR UTILITIES.

Inspect conduit before installation to detect any apparent defects. Mark defective materials with white paint and promptly remove from the site.

Particular care shall be taken to prevent damage to pipe and fitting linings and coatings. Pipe shall be protected during handling against impact shocks and free fall.

Lay conduit beginning at the low point of a system, true to the grades and alignment indicated with unbroken continuity of invert. The line and invert grade of each pipe shall be checked from top line carried on batter boards not over 24' apart or by a laser and target.

Cross above or below other pipe a minimum of 6" unless otherwise directed by the Engineer.

Place bell ends of conduit or the groove end of concrete facing upstream.

Bell holes shall be excavated for each joint to assure bedding supports the barrel of the pipe and to facilitate making a perfect joint. Preparatory to making pipe joints, all surfaces of the portion of the pipe to be jointed or of the factory-made jointing materials shall be clean and dry.

Install gaskets in accordance with manufacturer's recommendations for the use of lubricants, cements, and other special installation requirements.

The Contract Documents shall provide for the construction of a 6" Foundation Bedding of No. 57 crushed stone pipe bedding in the bottom of trenches. Reference Drawings and Section 02210 TRENCHING AND BACKFILLING FOR UTILITIES.

When unstable trench bottom material is encountered, such unstable material shall be removed to the depth required by the Owner's testing firm representative and replaced with No.57 stone such that the pipe will be adequately supported throughout the entire length. Excavation below the planned pipe invert elevation as shown on the Approved Plans shall be refilled with No. 57 crushed stone.

Reinforced Concrete Pipe (RCP): Install in accordance with applicable provisions of the American Concrete Pipe Association "Concrete Pipe Field Manual", unless otherwise indicated.

PVC PIPE INSTALLATION:

Flexible thermoplastic sewer pipe shall be installed in accordance with ASTM D2321- 83a, except as modified by these specifications and the specific recommendations of the pipe manufacturer.

Pipe cutting, where permitted, shall be done in accordance with the written recommendations of the pipe manufacturer. Only factory cut ends shall be used for solvent weld joints.

Trenches shall be excavated in straight lines and uniformly sloped between manholes or junction structures. The trench shall be excavated a minimum of six inches (6") below the pipe bottom in order to receive the required bedding of Class I No. 57 crushed stone. Pipe bedding, haunching and backfilling shall be in accordance with requirements set forth in Section 02210, TRENCHING AND BACKFILLING FOR UTILITIES.

Cleaning Conduit: Clear the interior of conduit of dirt and other superfluous material as the work progresses.

Place plugs in the ends of uncompleted conduit at the end of the day or whenever work stops.

Flush lines between manholes as required to remove collected debris.

Interior Inspection: Inspect conduit to determine whether line displacement or other damage has occurred.

A light held in a manhole shall show a full circle of light when viewed from the adjoining end of the line.

Make inspections after lines between manholes, or manhole locations, have been installed and approximately two feet of backfill is in place and at completion of the project.

If the inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, take whatever steps are necessary to correct such defects to the satisfaction of the Engineer.

Connection to Existing Structures: Pipe connections to existing structures shall be made in such manner that the finished work will conform as nearly as practicable to the essential applicable requirements specified for new structures, including all necessary concrete work, cutting, and shaping.

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, and Division 1 specifications that apply to the work specified in this Section.

CHAIN LINK FENCING AND GATES:

Provide chain link fences and gates as complete units controlled by a single source including necessary erection accessories, fittings, and fastenings.

1. This Section includes industrial/commercial chain link fence and gates specifications:
2. Galvanized steel coated chain link fabric
3. Galvanized steel framework and fittings
4. Black PVC coated steel chain link fencing
5. Gates: swing and cantilever slide
6. Barbed wire
7. Polyester wind screening (at playgrounds chain link fences)

SUBMITTALS:

Product Data: Submit manufacturer's technical product data, and installation instructions for metal fencing, fabric, gates and accessories.

Dimensions indicated for pipe, roll-formed, and H-sections are outside dimensions, exclusive of coatings.

PRODUCTS:

Manufacturer: Subject to compliance with requirements, provide products of one of the following:

Galvanized and Black PVC Coated Steel Fencing and Fabric:

Allied Tube and Conduit Corp.

American Fence Corp.

Anchor Fence, Inc.

Woven Vinyl Coated Polyester Wind Screening:

Promats Company – North Carolina

Collins Company

Galvanized Steel Fencing:

Fabric: No. 9 ga. (0.148") finished size steel wires, 2" mesh, with top selvages knuckled for fabric 60" high and under, and both top and bottom selvages twisted and barbed for fabric over 60" high.

Furnish one piece fabric widths for fencing up to 12' high.

Fabric finish, galvanized, ASTM A 392, Class I, with not less than 1.2 oz. zinc per sq. ft. of surface.

Framework: Galvanized steel, ASTM A 120 or ASTM A 123, with not less than 1.8 oz. zinc per sq. ft. of surface.

Fittings and Accessories: Galvanized, ASTM A 153, with zinc weights per Table I.

Metallic Coated Steel Barbed Wire: Comply with ASTM A121, 12-4-5-14R, double 12-½ gauge twisted strand wire, with 4 point 14 gauge round barbs spaced 5 inches on center. Match coating type to that of the chain link fabric, 12-4-5-14R specifically designed for chain link fence applications.

Coating Type Z - Zinc-coated: Strand wire coating Type Z, Class 3, 0.80 oz/ft², barb coating 0.70 oz/ft².

Black PVC Coated Steel Fencing: (where indicated on Drawings)

Fabric finish, minimum 7 mil black PVC thermally bonded coating over galvanized, ASTM A 392, Class I, with not less than 1.2 oz. zinc per sq. ft. of surface.

Framework: Minimum 7 mil black PVC thermally bonded coating over galvanized steel, ASTM A 120 or ASTM A 123, with not less than 1.8 oz. zinc per sq. ft. of surface.

Fittings and Accessories: Minimum 7 mil black PVC thermally bonded coating over galvanized, ASTM A 153, with zinc weights per Table I.

Framing and Accessories:

End, Corner, and Pull Posts: Minimum sizes and weights as follows:

- Up to 6' fabric height, 2.375" od steel pipe, 3.65 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.
- Over 6' fabric height, 2.875" od steel pipe, 5.79 lbs. per lin. ft., or 3.5" roll-formed sections, 4.85 lbs. per lin. ft.

Line Posts: Space 10' o.c. maximum, unless otherwise indicated, of following minimum sizes and weights.

- Up to 6' fabric height, 1.90" od steel pipe, 2.70 lbs. per lin. ft. or 1.875" x 1.625" C sections, 2.28 lbs. per lin. ft.
- Over 6' to 8' fabric height, 2.375" od steel pipe, 3.65 lbs. per lin. ft. or 2.25" x 1.875" H-sections, 2.64" lbs. per lin. ft.
- Over 8' fabric height, 2.875" od steel pipe, 5.79 lbs. per lin. ft. or 2.25" x 1.875" H-sections, 3.26 lbs. per lin. ft.

Gate Posts: Furnish posts for supporting single gate leaf, or one leaf of a double installation, for nominal gate widths as follows:

<u>Leaf Width</u>	<u>Gate Post</u>	<u>lbs. / lin. ft.</u>
• Up to 6'	3.5" x 3.5" roll-formed section or 2.875" od pipe	4.85 5.79
• Over 6' to 13'	4.000" od pipe	9.11
• Over 13' to 18'	6.625" od pipe	18.97
• Over 18'	8.625" od pipe	28.55

Top Rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate corner, pull and end post.

1.66" od pipe, 2.27 lbs. per ft. or 1.625" x 1.25" roll-formed sections, 1.35 lbs. per ft.

Tension Wire: 7-gage, coated coil spring wire, metal and finish to match fabric.

Locate at bottom of fabric.

Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener.

Post Tops: Provide weathertight closure cap with loop to receive tension wire or top rail; one cap for each post.

Stretcher Bars: One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x 3/4". Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into post.

Stretcher Bar Bands: Space not over 15" o.c., to secure stretcher bars to end, corner, pull, and gate posts.

Barbed Wire Arms: In compliance with ASTM F626, pressed steel galvanized after fabrication, minimum zinc coating of 1.20 oz. /ft², capable of supporting a vertical 250 lb. load. Type I – three strand 45 degree arm.

Gates: Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal of breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Space frame members maximum of 8' apart unless otherwise indicated.

Provide same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate frame at not more than 15" o.c.

Install diagonal cross-bracing consisting of 3/8" diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

Where barbed wire is indicated above gates, extend end members of gate frames 1'-0" above top member. Provide necessary clips to receive and secure 3 strands of wire.

Swing Gates: Fabricate perimeter frames of minimum 1.90" od pipe.

Gate Hardware: Provide hardware and accessories for each gate, galvanized per ASTM A 153, and in accordance with the following:

- Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180° gate opening. Provide 1-1/2 pair of hinges for each leaf over 6' nominal height.
- Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

Double Gates: Provide gate stops for double gates, consisting of mushroom type flush plate with anchors, set in concrete, and designed to engage center drop rod or plunger bar.

Include locking device and padlock eyes as integral part of latch, permitting both gate leaves to be locked with single padlock.

Sliding Gates: Provide manufacturer's standard heavy-duty inverted channel track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, hardware, and accessories as required.

Wire Ties: For tying fabric to line posts, use wire ties spaced 12" o.c. For tying fabric to rails and braces, use wire ties spaced 24" o.c. For tying fabric to tension wires, use hog rings spaced 24" o.c.

Manufacturer's standard procedure will be accepted if of equal strength and durability.

Woven Vinyl Coated Polyester Wind Screening: (at playgrounds chain link fencing)

Provide windscreen equivalent to Promats Company's VCP Windscreen with reinforced grommets. Woven 3.0 ounce per square yard polyester material, coated after weaving with 6.0 ounce per square yard coating of dark poly vinyl chloride coating, for a total weight of 9.0 ounces per square yard. Provide a reinforced grommet perimeter binding. Provide a 3-year warranty covering peeling, cracking, grommet failure and the coating.

Tensile strength when tested per the grab method shall be 230 x 200 pounds. All hems and center seams shall be four-ply reinforced with heavy-duty 18 oz. vinyl coated nylon. Hems and seams shall be sewn with #7 weather and ultraviolet light resistant dacron thread. Grommets shall be brass, spaced at a maximum of 12" apart on all hems. Die cut air vents shall be placed at a maximum of 10' O.C. spacing.

Concrete: Provide concrete consisting of portland cement, ASTM C 150, aggregates ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi using at least 4 sacks of cement per cu. yd., 1" minimum size aggregate, maximum 3" slump, and 2% to 4% entrained air.

Excavation: If not shown on drawings, excavate holes to minimum depth and diameter as recommended by fence manufacturer.

Installation: Install in accordance with Drawings, ASTM F 567, and written installation instructions of fencing manufacturer to provide secure, aligned installation.

Barbed Wire Installation: Stretched taut between terminal posts and secured in the slots provided on the line post barb arms. Attach each strand of barbed wire to the terminal post using a brace band.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

1.1 SECTION INCLUDES

- A. Formwork for cast—in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.2 RELATED SECTIONS

- A. Section 03200 — Concrete Reinforcement.
- B. Section 03300 — Cast-in-Place Concrete.

1.3 REFERENCES

- A. ACI 301 — Structural Concrete for Buildings.
- B. ACI 318 — Building Code Requirements for Reinforced Concrete.
- C. PS 1 — Construction and Industrial Plywood.

1.4 DESIGN REQUIREMENTS

- A. Design and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and 318.
- B. Maintain one copy of each document on site.

1.6 REGULATORY REQUIREMENTS

- A. Conform to ACI 301 and ACI 318 code for design, fabrication, erection and removal of formwork.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site to prevent damage.
- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.8 COORDINATION

- A. Coordinate this Section with other Sections of work which require attachment of components to formwork.
- B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

PART 2: PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Plywood: Douglas Fir; solid one side, tight faced undamaged sheets with clean, true edges.

2.2 MANUFACTURERS — PREFABRICATED FORMS

- A. Symons or equal.

2.3 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Steel Tubular Column Type: Round, steel material, minimum 16 gage, surface treated with release agent, of sizes required.

2.4 FORMWORK ACCESSORIES

- A. Form Ties: Snap—off type, galvanized metal, cone type, with waterproofing washer.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture.
- C. Dovetail Anchor Slot: Galvanized steel, 22 gage, foam filled.
- D. Flashing Reglets: Galvanized steel, 22 gage, longest possible lengths, with alignment splines for joints, foam filled,
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- F. Waterstops: Hydrophylic type as manufactured by American Colloid or approved equal.

PART 3: EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil, mud, and debris prior to placing concrete.

3.3 ERECTION — FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on exposed external corners.

3.4 APPLICATION — FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Position recessed reglets for brick veneer masonry anchors to spacing and intervals noted on drawings or specified in Section 04200.
- E. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- F. Install waterstops in accordance with manufacturer's instruction continuous without displacing reinforcement.
- G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean—out ports.

- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.

3.8 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Work of this Section shall include furnishing all labor and materials required to provide all cast-in-place concrete scheduled on Drawings and as specified in this Section.

Related Work Specified Elsewhere:

Concrete Formwork (Section 03100)
Concrete Reinforcement (Section 03300)

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this section refer to Industry Standards Index in Division 1.

LEED NC, U. S. Green Building Council

DELIVERY AND PROTECTION OF MATERIALS:

Store cement in weather tight structure with floor at least 12 inches off ground, and accessible for inspection in original packages.

Store fine and coarse aggregate separately. Segregate sizes and avoid getting dirt and foreign materials in concrete.

Deliver ready-mixed concrete in compliance with requirements set forth in ASTM C 94.

Provide documentation of LEED credits requirements for use of local regional materials.

SEVERE-WEATHER PROVISIONS:

Cold-Weather Concreting: (In accordance with ACI 306 and as follows):

Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather. Do not use frozen materials, or materials containing ice.

All concrete materials and all reinforcement, forms, fillers, and around which concrete is in contact shall be free from frost.

Whenever temperature of surrounding air is below 40 degrees F., all concrete shall have temperature between 70 degrees and 80 degrees F. Provide adequate means for maintaining temperature not less than 70 degrees F. for three days, or 50 degrees F. for five days, or for as much more time as is necessary to insure curing of concrete.

Use no salt or other chemicals to prevent freezing.

Housing, covering, or other protection used in connection with curing shall remain in place, intact, at least 24 hours after artificial heat is discontinued.

Hot Weather Concreting: (In accordance with ACI 305 and as follows):

Provide adequate methods of lowering temperature of concrete ingredients so that temperature of concrete when placed does not exceed 90 degrees F.

When weather is such as to raise concrete temperature, as placed, consistently above 80 degrees F., use approved retarder.

Sprinkle all subgrade and forms with water before placing concrete. Remove all excess water before placing concrete.

Start curing as soon as practicable to prevent evaporation of water and keep forms wet. Protect flat work from dry wind, direct sun, and high temperatures.

PART 2: PRODUCTS

CEMENT:

Cement shall be standard portland cement of United States manufacture, conforming to ASTM C 150, Type I or Type III. Only one brand of commercial portland cement shall be used. Each bag shall weigh approximately 94 pounds and contain one cubic foot.

CONCRETE AGGREGATES:

Fine Aggregate: Washed sand having clean, hard, durable, uncoated grains, free from harmful substances conforming to ASTM C 33.

Coarse Aggregate for standard-weight concrete: crushed stone, gravel, or other approved inert material having clean, hard, durable uncoated particles conforming to ASTM C 33. Maximum size, in accordance with ACI 318.

Lightweight Coarse Aggregate shall conform to ASTM C 330. Lightweight aggregate shall be expanded shale or slate. Maximum size of aggregate shall be of 3/4".

WATER:

Clean and free from harmful amounts of acids, alkalis, or organic materials. No water shall be added at the site unless delivered, documented, and approved by the batch plant and testing agency.

VAPOR BARRIER:

Vapor barrier under floor slabs on earth shall be puncture resistant polyethylene sheet not less than 15 mils thick, with permeance of less than 0.01 perms per ASTM F 1249 or ASTM E 96, and in compliance with ASTM E 1745 Class A and ACI 302. Accessories would include seam tape and vapor proofing mastic with permeance less than 0.03 perms. Provide pipe boots constructed from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

EXPANSION JOINT MATERIALS:

Expansion joint material shall be asphalt-impregnated fiber strips, 1/2" thick, unless otherwise shown or noted: Flexcell by Celotex Corporation, Sealtight by W. R. Meadows, Inc., Joint Filler by Serviced Products Corporation, or approved equal.

ADMIXTURES:

Water Reducing Admixture: ASTM C 494, Type A, and contain no chloride ions.

Air Entraining Admixture: ASTM C 60 for slabs permanently exposed to weather. No air entraining admixture is to be used for concrete not exposed to weather. Air content is to be confirmed by lab tests for both air entrained and non-air entrained mixes.

CLASS OF CONCRETE:

f'c minimum 4000 psi, maximum 150 pcf (regular weight) for exposed exterior concrete.

f'c minimum 3000 psi, maximum 150 pcf (regular weight).

f'c minimum 3000 psi, maximum 120 pcf (light weight-for use in elevated slabs).

f'c minimum 3000 psi, maximum 150 pcf (regular weight pea gravel) high slump mix for brick walls and concrete masonry fill.

MIX DESIGNS:

Contractor shall select a testing laboratory acceptable to Architect to verify mixes of all classes of concrete.

Contractor shall submit samples in adequate quantities for each mix verification, of all concrete materials to be used on project to designated testing laboratory.

Laboratory shall be engaged by and paid by the contractor out of the material testing allowance.

Submit four (4) copies of all mix design, aggregate test results, and compression test results to Architect prior to use on the job.

PLANT MIXING:

Proportioning Concrete:

Stresses for design of this structure are based on specified minimum 28-day compressive strength of concrete. Proportions shall be in compliance with approved design mix for each class of concrete.

Batching:

Ready-mixed concrete shall be mixed and delivered in accordance with requirements of ASTM C 94.

Producer shall furnish delivery ticket with each load of concrete delivered under this Specification. Delivery ticket shall show clearly class and strength of concrete, size of coarse aggregate, slump ordered, and date and time of departure from batching plant.

1. Stresses for design of this structure are based on specified minimum 28-day compressive strength of concrete. Proportions shall be in compliance with approved design mix for each class of concrete.
2. Regular weight 3000 psi or 4000 psi concrete shall be proportioned for a slump of 4" + or - 1".
3. Lightweight 3000 psi concrete shall be proportioned for a slump of 6" + or - 1".

4. Fine aggregate 3000 psi concrete masonry grout shall be proportioned for a slump of 10" + or - 2".
5. All concrete shall be proportioned for a maximum water to cement ratio 0.5.
6. Concrete not permanently exposed to weather such as concrete for foundations, interior slabs on grade, concrete unit masonry grout, and elevated slabs on composite metal deck shall not have air added by entrainment admixtures. This requirement shall be verified by the testing laboratory.
7. Concrete to be permanently exposed to weather shall have air added by entrainment admixtures. Air content shall be 5% + or – 1%. This requirement shall be verified by the testing laboratory.

CONVEYING EQUIPMENT:

Carts or buggies transporting concrete more than 50 feet shall be equipped with pneumatic tires.

Equipment for chuting or conveying concrete shall be of sufficient size to insure continuous flow of concrete at delivery and without separation of materials.

PART 3: EXECUTION

EVALUATION OF COMPRESSION TESTS:

Evaluation of results of tests for ultimate-strength design concrete shall be according to ACI 318.

Neither results of laboratory verification tests nor any provision in Contract Documents shall relieve Contractor of obligation to furnish concrete of class and strength specified.

INSPECTION OF WORK BEFORE PLACING:

Inspect work to receive concrete for deficiencies which would prevent proper execution of finished work. Do not proceed with placing until such deficiencies are corrected.

Do not place concrete on earth until fill or excavation has been prepared as set forth under applicable sections of specifications for that work as verified by the testing lab.

Before any concrete is placed in form, all pipes or sleeves, openings, or embedded items shall be in place and shall receive all tests specified for them.

Remove all grease, oil, mud or other foreign matter from forms and have reinforcing steel in proper condition and position before placement of concrete. Dowels shall be in place and tied off prior to placing concrete.

Remove hardened, or partially hardened, concrete on forms or reinforcement before placing concrete.

CONVEYING:

Convey concrete from mixer to placement by methods which will prevent separation or loss of material. No water shall be added at the site to aid placement of concrete. Concrete too stiff to be properly placed shall be rejected and removed from the site and legally disposed of at no additional cost to the owner.

Runway supports shall not bear upon reinforcing steel or fresh concrete.

If pump(s) are used for conveying concrete, there shall be no aluminum in contact with the concrete, either in pump or in conveying pipes.

Clean conveying equipment thoroughly before run of concrete at frequent intervals.

CONSTRUCTION AND EXPANSION JOINTS:

Construction Joints: Early in construction program, contractor shall review with Architect construction joints he proposes to use, not indicated on the Drawings. Contractor shall not use any construction joints not approved by Architect.

Expansion Joints: Install as indicated.

PLACING:

Deposit concrete as nearly as practicable in its final position to avoid rehandling. Do not deposit concrete on work partially hardened or contaminated by foreign material. Do not use retempered concrete. In no case use concrete when elapsed time, after addition of water and cement to batch, exceeds one hour.

Concrete shall not be dropped more than four feet. For dropping greater distances use metal chutes or tremie pipes.

Once concreting is started carry on as continuous operation until placing of section is completed. Finish top surface to true plane. When construction joints are necessary, they shall be made in accordance with article above. Do not allow cold joints to occur within pours.

Compact all concrete thoroughly by suitable means during placing, and work thoroughly around reinforcement, embedded fixtures, and into corners of forms. When vibrator is used, apply directly to concrete. Do not over vibrate.

PROTECTION

During curing period protect concrete from damaging mechanical disturbances, particularly load stresses, heavy stock, and excessive vibration. Protect all finished concrete surfaces from damage by construction equipment, materials, or methods, and by rain, running water, hot sun, or windy conditions. Do not load self supporting structures in such a way as to overstress concrete.

Coordinate with protection requirements of Section 03362 – Polished Concrete Floor Finishes.

TESTING:

Conduct strength tests of concrete in accordance with following procedures:

Secure composite samples in accordance with "Method of Sampling Fresh Concrete" (ASTM C 172).

Mold and cure five specimens from each sample in accordance with "Method of Making and Curing Concrete Compression and Flexure Specimens in the Field" (ASTM C 31). Five specimen comprise one test.

Test Two Specimens at 7 days (ASTM C 39). Test two specimens at 28 days in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C 39). Test evaluation shall be conducted in accordance with provisions of ACI 318. Keep one Specimen in reserve.

Make one strength test for each 100 cu. yds. or fraction thereof for each mix design of concrete placed in any one day, except that in no case shall given mix design be represented by less than five tests.

Testing Laboratory shall be selected and paid by the Contractor out of the material testing allowance.

Report all test results to Architect, Structural Engineer, and Contractor on same day that tests are made.

Testing laboratory shall make and handle all test cylinders.

NON-CONFORMING MATERIAL

Any tested concrete material that fails to meet design strength at 28 days shall be removed and repoured. Substandard concrete may be allowed to remain if certified structurally adequate by a qualified independent engineer and approved by the Owner and Architect, however, the cost of the substandard material shall be deducted from the contract sum.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Work shall consist of providing specified finishes to all cast-in-place concrete shown on drawings.

RELATED WORK:

Coordinate with requirements and work specified in Specification Section 03362 - Polished Concrete Floor Finishes.

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this Section refer to Industry Standards Index in Division 1.

SUBMITTALS:

Submit (in duplicate) Manufacturer's printed instructions for application of curing compounds and floor hardeners.

Coordinate with submittal requirements in Section 03362 – Polished Concrete Floor Finishes.

PART 2: PRODUCTS

FINE AGGREGATE: ASTM C 33, fine aggregate. Natural sand

PORTLAND CEMENT: ASTM C 150, Type 1, gray.

WATER:

Potable, and free of chemicals affecting set of cement.

CURING COMPOUND AND SEALER:

Transparent, resinous sealer, in volatile, conforming to ASTM C 309.

Coordinate with products specified in Section 03362 – Polished Concrete Floor Finishes.

LIQUID CHEMICAL FLOOR HARDENER:

Colorless, aqueous solution containing blend of magnesium fluosilicate and zinc fluosilicate with wetting agent, containing not less than 2 lbs. fluosilicates per gallon. Compound shall be approved by Architect in writing.

Coordinate with products specified in Section 03362 – Polished Concrete Floor Finishes.

ABRASIVE AGGREGATE:

Ceramically bonded aluminum oxide grains 1/8" to 1/32" size. Material shall be delivered to the site in the manufacturer's original container. Submit sample and manufacturer's descriptive data for approval.

JOINT SEALANTS:

Apply interior and exterior joint sealant products required by drawings at locations indicated on drawings.

PROTECTION:

Coordinate with protection requirements specified in Section 03362 – Polished Concrete Floor Finishes.

PART 3: EXECUTION

PATCHING CONCRETE:

Concrete which is not formed as shown on Drawings, or is out of alignment or level, or shows defective surface, or shows defects which reduce structural strength of member or members, shall be considered as not conforming to intent of these specifications and shall be removed from job by Contractor at his expense, unless Architect grants permission to patch effective area. Permission to patch any such area shall not be considered a waiver of Architect's right to require complete removal of defective work if patching does not, in his opinion, satisfactorily restore quality and appearance of surface, or if patching does not restore structural strength of member or members.

After removing forms, inspect all concrete surfaces. Patch any pour joints, voids, honeycomb, stone pockets, or other defective areas permitted by Architect to be patched, and all tie holes. Where necessary, chip away defective areas to depth of not less than 1", with edges perpendicular to surface. Wet area to be patched and space at least 6" wide entirely surrounding it to prevent absorption of water from patching mortar. Brush grout of equal parts portland cement and sand (with sufficient water to produce brushing consistency) into surface, followed immediately by patching mortar. Patching mortar shall be made of same material (and of approximately same proportions) as used for concrete except that coarse aggregate shall be omitted. Mortar shall not be richer than 1 part cement to 3 parts sand. Amount of mixing water shall be as little as is consistent with requirements of handling and placing. Mortar shall be retempered without addition of water by allowing it to stand for period of one hour, during which time it shall be mixed occasionally with trowel to prevent setting.

Compact mortar thoroughly into place and screed off to leave patch slightly higher than surrounding surface. Leave patch undisturbed for period of 1 to 2 hours to permit initial shrinkage before beginning final finishing. Finish patch in manner to match adjoining surface. On exposed surface where unlined forms have been used, obtain final finish by striking off surface with straight-edge spanning patch, held parallel to direction of form marks. All patches shall be used in accordance with curing requirements for surface in which patch occurs. Keep patch moist for not less than 3 days after installation.

Tie-holes left by withdrawal of rods, or holes, left by removal of ends of ties shall be filled solidly with mortar after first being wet thoroughly. Any excess mortar at surface of wall shall be struck off flush with cloth.

FLATNESS AND LEVELNESS:

Comply with ACI Standard No. 117 and provide floors with a flatness of F25 and a levelness of F20. Use laser guided equipment to set all forms. Use laser guided highway screed to achieve specified levelness and flatness. Use of BULLFLOATS is prohibited.

Areas of Integrally Colored and Dye Stained Polished Concrete Floor Finishes: Comply with ACI Standard No. 117 and provide floors with a flatness of minimum F50 and a minimum levelness of F30.

Use laser guided equipment to set all forms. Use laser guided highway screed to achieve specified levelness and flatness. Use of BULLFLOATS is prohibited.

TESTING:

Floors shall be tested for levelness and flatness by an independent testing agency, using a "Dipstick Floor Profiler". Floors that do not meet specification will be removed and re-constructed.

MONOLITHIC CEMENT FINISH:

Apply steel trowel finish to surface of concrete roof and floor slabs as follows:

- For all floors where, in Finish Schedule, resilient flooring or carpet covering is called for.
- For all roof slab areas (for future use as floor).
- For all other concrete floors, stairs, platforms, or slabs where, in Finish Schedule, or shown on Drawings, exposed concrete finish is called for, unless otherwise noted.

Screed floor slabs to an even surface by use of straight-edge and screeding strips accurately to proper grade. Float concrete with laser guided highway screed in manner which will compact and produce surface free from depressions or unevenness. Floors shall be level and flat within tolerances and guidelines specified, except where drains occur (in which cases floors shall be pitched to drains). Steel trowel concrete after concrete has hardened sufficiently to prevent fine materials from working to top, and only after all water sheen has disappeared. Drying of surface moisture before troweling shall proceed naturally, and shall not be hastened by dusting on of dry sand or cement. Perform final troweling after concrete has hardened so that no mortar accumulates on trowel and ringing sound is produced as trowel is drawn over surface.

Coordinate with requirements and work specified in Specification Section 03362 - Polished Concrete Floor Finishes.

Exterior Concreted Areas:

Provide all (walks and vertical surfaces) surfaces with a unidirectional fine broom finish, with concrete walk 1/2" tooled expansion joints at 30' centers maximum and sawcut joints at 5' centers maximum. Pour sample for Architect approval.

CURING:

General Requirements for Curing:

Prevent surfaces of concrete from drying out until required curing time has elapsed. Start curing procedures immediately following initial set of concrete.

Surfaces to Receive Finishes Set in Portland Cement Setting Beds:

Cover with non-staining, reinforced kraft paper. Lap kraft paper, and keep weighted down to prevent evaporation. Do not use membrane curing compound on these surfaces.

FLOOR HARDENER:

Apply to floor surfaces to be exposed in accordance with Manufacturer's printed instructions, and at a rate of not less than 100 sq. ft. per gallon. Apply uniform coating to avoid mottled appearance.

GLOSS URETHANE FLOOR SEALER FOR EQUIPMENT PLATFORMS, BOILER ROOMS, MECHANICAL ROOMS, ELECTRICAL ROOMS, CUSTODIAL ROOMS: (Apply whether scheduled or not; typical)

After all areas are final cleaned, to include removal of all stains and exposed reinforcing fibers, apply gray gloss urethane to floor surfaces to be exposed (no floor finishes except sealer) in accordance with Manufacturer's printed instructions, and at a rate of not less than manufacture's application rate instructions and to achieve a permanent high gloss sheen. Apply uniform coating to avoid mottled appearance. Coordinate with Section 09900 requirements.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements For Reinforced Concrete.
- C. ACI SP-66 - American Concrete Institute - Detailing Manual.
- D. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
- E. ANSI/ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- F. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- G. ANSI/ASTM A496 - Deformed Steel Wire Fabric for Concrete Reinforcement.
- H. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- I. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- J. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- K. ASTM A616 - Rail Steel Deformed and Plain Bars for Concrete Reinforcement.
- L. ASTM A617 - Axle Steel Deformed and Plain Bars for Concrete Reinforcement.
- M. ASTM A704 - Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
- N. ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
- O. ASTM A767 - Zinc-Coated (Galvanized) Bars for Concrete Reinforcement.
- P. ASTM A775 - Epoxy-Coated Reinforcing Steel Bars.
- Q. ASTM D3963 - Epoxy-Coated Reinforcing Steel.
- R. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete and Shotcrete
- S. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.
- T. CRSI - Concrete Reinforcing Steel Institute - Manual of Practice.
- U. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.

- V. CRSI 65 - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Submit in writing any request for deviation from the design drawings and specifications.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice, ACI 301, ACI SP-66, ACI 318, ANSI/ASTM A184.
- B. Submit certified copies of mill test report of reinforcement materials analysis.

1.5 COORDINATION

- A. Coordinate with placement of formwork, formed openings and other Work.

PART 2: PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, unfinished.
- B. Welded Steel Wire Fabric: ASTM A185 Plain Type; in flat sheets; unfinished. Rolled WWF shall not be acceptable for use on this job.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Stainless steel type; size and shape as required.

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice ACI SP-66, ACI 318 ANSI/ASTM A184.
- B. Locate reinforcing splices not indicated on drawings, at point of minimum stress. Indicate location of splices on shop drawings for approval by the Architect/Engineer.

PART 3: EXECUTION

3.1 HANDLING AND STORAGE

- A. Provide proper equipment for safe off loading and handling of material.
- B. Provide proper clean level storage area with proper skids to keep material clear of mud and water.
- C. Keep material free from mud and other deleterious materials that will reduce bond and do not place any reinforcing bars that are bent, twisted, broken, pitted, or otherwise unsuitable for use on the project as determined by the architect.
- D. All necessary field bending and straightening shall be accomplished without heating the material.
- E. Cutting torch shall be used only for cut off of material but not for bending. All heat bent material will be rejected by the inspector and shall be promptly removed and replaced at no additional cost. Do not weld reinforcing bars.

3.2 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position. WWF laying on the metal deck and being manually pulled up into the fresh concrete during concrete placement operations shall not be acceptable.
- B. Do not displace or damage vapor barriers. Damaged vapor barrier shall be removed and replaced at the direction of the Architect.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as indicated on drawings.
- E. Provide proper and adequate supports at maximum 3 ft x 3 ft spacing each way for support of wwf in the designated position. Tie off wwf sheets so that placement of the fresh concrete will not cause the wwf to be displaced. Pulling up of the wwf sheets into freshly placed concrete will not be an acceptable means of placing the wwf.

3.3 FIELD QUALITY CONTROL

- A. Field inspection will be performed by the Architect.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION:

Work Included: The work required under this Section includes furnishing all labor, equipment, materials, and services necessary to complete the brick and masonry block work indicated on the Drawings, or specified herein.

QUALITY ASSURANCE:

Qualifications of Workmen: The masonry work shall be accomplished by experienced masons under the direct supervision of a journey man mason.

Codes and Standards: In addition to complying with all pertinent codes and regulations, material and workmanship shall comply with standards of the National Concrete Masonry Association and the Structural Clay Products Institute.

SUBMITTALS:

Samples: Within thirty (30) days after award of Contract, and before any brick or unit masonry materials are delivered to the job site, submit samples as required of the proposed brick and concrete masonry units to the Architect for his approval.

Certification: Prior to delivery of concrete unit masonry to the job site, deliver to the Architect a letter from the manufacturer of the concrete masonry units certifying that all such concrete masonry units delivered to the job site are in strict conformance with the provisions of this Section of these Specifications.

Sample Panels: Before the masonry work is started, approved sample panels approximately 5 feet long by 4 feet high and of the proper thickness shall be constructed at the job site, reviewed and approved by the Architect. One face shall show the workmanship, coursing, bond, mortar joint thickness, tooling of joints, and range of brick color and texture, all to be as specified or selected by the Architect/Engineer. Sample panel shall duplicate the wall assembly construction with the thru-wall flashing system. The finished work shall match the approved sample panel. Mock up to be maintained throughout construction for workmanship reference.

PRODUCT HANDLING:

Protection: Use all means necessary to protect brick and concrete masonry materials before, during, and after installation and to protect the installed work and materials of all other trades. Cover masonry blocks and brick to prevent excessive moisture absorption.

Portland Cement, lime, and/or pre-packaged mortar mixes shall be delivered to the site and stored in unbroken bags or other approved containers. These materials shall be stored in dry, weather tight sheds or enclosures with elevated floors, which will prevent the inclusion of foreign materials and damage by water or dampness. Masonry sand shall be delivered and stored in a manner to prevent inclusion of foreign material. Brick shall be delivered and stored on the job site on platforms or timbers, clear of the ground. Brick which are chipped, cracked, broken, or marred in other manner shall not be used where exposed to view.

PART 2: PRODUCTS

CONCRETE MASONRY UNITS:

General: All concrete masonry units shall be of sizes shown on Drawings, two-cell type, in gray or neutral color, and conforming with ASTM C-90 Standard Specification for Load Bearing Concrete Masonry Units. Provide units with bullnosed exterior corners at all exposed areas.

Standard Grey CMU:

Size: As indicated in the drawings

Color: Standard Color and Texture.

Minimum Net Area Average Compressive Strength: Average of three units 2000 PSI, no individual unit less than 1800 PSI.

Maximum Absorption: Absorption is less than 18 lbs/CF.

Weight Classification: Units shall be lightweight, blended with expanded shale, clay or slate, produced by the rotary kiln process and shall comply with ASTM C331 and ASTM C33 and shall be graded to assure consistent texture.

All units shall be free of organic impurities that will cause rusting, staining, or pop outs and shall contain no combustible material. All lightweight material to be manufactured by rotary kiln process. The use of coal burning power plants residue aggregate (bottom ash) or similar waste products will not be allowed.

The producer of the lightweight concrete masonry units shall furnish a letter of certification stating that all lightweight aggregate used in the manufacturer of the units was expanded shale, clay or slate produced by the rotary kiln process, Big River industries or approved equal conforming to ASTM C331 and ASTM C33.

Acceptable Manufacturers:

Adams Products Company - Oldcastle, Johnson Concrete Company or approved equal. Manufacturer other than approved listed shall provide submittal samples and received written approval by the Architect prior to bid.

BRICK: (MATCH EXISTING)

Common brick to be modular size, nominal 2 1/4" x 4" x 8", and shall conform to ASTM C-62, grade MW, for use below grade and where not exposed. Match Existing.

Face brick shall be through body wire-cut, modular size nominal 2 1/4" x 4" x 8", and conform to ASTM C-69, grade SW, use for all exposed brick, unless otherwise noted. Color to Match Existing.

MORTAR:

General: Cementitious materials and aggregates shall be handled and stored in such a manner as to prevent deterioration or intrusion of foreign materials. Each material shall be of like brand; all sand shall be supplied from a single source; sand color to be approved by Architect.

Cement: Shall be Portland Cement, Type I or II, meeting Standard Specifications for Portland Cement (ASTM C-150).

Sand: Shall be clean, washed, and meet the requirements of Standard Specification for Aggregate or Masonry Mortar (ASTM C-144-76), with the gradation to satisfy paragraph 3, Grading, and with the omission of subparagraph 3.4.

Hydrated Lime: Shall meet the requirements of the Standard Specification for Hydrated Lime for Masonry Purposes (ASTM C-207), Type S.

Hydraulic Hydrated Lime: Shall meet the requirements of the Standard Specification for Hydraulic Hydrated Lime for Structural Purposes (ASTM C-141).

Color: Mortar shall MATCH EXISTING.

Water: Shall be potable.

Admixture-workability and air entraining admixtures may be utilized and shall conform to ASTM C-260.

Portland Cement: ASTM C-10, or Fed. Spec. SS-C-192, Type I, II, or III.

Aggregates: ASTM C-144, aggregate for masonry mortar.

Water: Shall be clean and free of deleterious amounts of acids, alkalies, or organic materials.

Plasticizing Agent: Shall be OMICRON by Master Builders, "Hydrocide Powder", by Sonneborn Bldg. Products, Inc., Subsidiary of DeSoto, Inc., "Hydrolox 400" by Chem-Masters Corp., or approved equal, and used in accordance with mfgs. instructions.

Anti-Freeze Compounds: No anti-freeze liquid, salt, accelerating admixture for masonry mortar or other substance shall be in the mortar to lower the freezing point of the mixing water or accelerate the set of the cement.

Prepackaged Mortar Mixes: Prepackaged mortar mixes may be used with the prior approval of the Architect. The mortar mix shall be in accordance with the following specifications.

Type S Mortar Mix: The mortar mix shall have a compressive strength of 1800 psi minimum at 28 days when tested in accordance with ASTM C-270.

The mortar mix shall contain Portland Cement, hydrated lime, plasticizing admixtures, and/or hydraulic hydrated lime. Mortar mixes which contain other materials, including ground limestone ground slag or other cementitious and non-cementitious materials, are not acceptable.

Bag Label: Each bag of mortar mix shall have a printed label thereon which shall show the contents. Contents shall be described by the percent by volume of Portland Cement (ASTM C-150).

Hydrated Lime (ASTM C-207), Hydraulic Hydrated Lime (ASTM C-141), and Admixtures (ASTM C-260).

Instructions for mixing the mortar mix shall be clearly printed on the container. These instructions shall be by volumetric measurement and shall be limited to the method of mixing in proper proportions of washed sand to 1 bag of the prepackaged mortar mix with water to produce a flow of the proper consistency.

The mortar mix shall be composed only of Portland Cement, Hydrated lime and/or Hydraulic Hydrated Lime and workability admixtures within the following limits:

- a. Maximum of 65% Portland Cement.
- b. Minimum of 33% Hydrated Lime and/or Hydraulic Hydrated Lime.

- c. Maximum of 2% Admixtures.

Air Content: The air content of the pre-packaged mortar mix shall be limited to 16% maximum when tested in accordance with ASTM C-91, Paragraphs 18 through 22.

Autoclave Expansion: Autoclave expansion of the mortar mix shall not exceed 1.0% when determined in accordance with ASTM Method C-151.

On-The-Job Mortar Mix:

Type S. Mortar shall have a compressive strength of 1800 psi minimum at 28 days. The mortar shall be proportioned within the following volumetric limits:

- a. 1 part Portland Cement
- b. 1/2 part Hydrated Lime
- c. Not less than 2 1/4 and not more than 3 times the sum of the volumes of cement and lime used of washed sand measured in a damp, loose condition.
- d. Plasticized per instructions of the mfr., the quantity of which is not to exceed 2% by volume of the cement and lime combination.

Measurement and Mixing:

The method of measuring materials shall be by volume and shall be such that the specified proportions of the mortar materials can be controlled and accurately maintained. A measuring device to make consistent volume measurements shall be used throughout the project. Measurement of washed sand by shovel shall not be permitted.

Mortar Mixer shall be a paddle-type mechanical mixer. It shall be of such design and size to accommodate the mix without overloading, and be adequately powered to vigorously mix the ingredients.

The mortar mixer shall be charged in this order: Add approximately one-half the water required, one-half the washed sand, the cement and lime or prepackaged mortar mix), the remaining amount of washed sand, and then sufficient water to bring the mix to desired consistency. Mortar shall be mixed for a minimum of five minutes after all materials have been charged into the mixer with all batches being mixed to the same consistency.

Mortars that have stiffened because of evaporation of water from the mortar may be retempered by adding water as frequently as needed to restore the required consistency. Mortars shall be used and placed in their final position within 2 hours after mixing. When the temperature is over 80 degrees F., the mortar shall be used within 1 1/2 hours after mixing. Mortar not used within these time periods shall be discarded.

HORIZONTAL JOINT REINFORCEMENT STEEL:

Standards: All components shall be hot-dip galvanized to ASTM A 153 after fabrication.

Joint Reinforcement for CMU/Brick Veneer Cavity Wall: Truss type in CMU backup wall with hook and key eye; steel wire, hot dip galvanized to ASTM A 153 after fabrication, cold drawn steel wire conforming to ASTM A82, 3/16 inch side rods with No.9 diagonal ties. Backup wall reinforcing shall be units no more than two (2) inches smaller in width than the wall thickness and shall be of deformed rods 3/16" side rods and 9 gage diagonal cross rods all galvanized. Veneer anchored with 3/16" keys and hooks, keys

are 4-point flush-welded to backup wall rods. Total unit width shall be no more than two (2) inches smaller in width than the total wall thickness. Hooks shall be extended into veneer wythe 1" from exterior face. Provide Hohmann & Barnard LOX-ALL Adjusto-Flex-Mesh #AF-H Truss, Wire-Bond Series 700 adjustable tab, Dur-O-Eye by Dayton Superior or approved equivalent products.

Interior CMU wall reinforcing shall be Truss Type, as mfgd. by AA Wire Products Co., "DUR-O-WALL", Hohmann & Barnard "LOX-ALL", or other approved equal products. Provide prefabricated corners and intersections. Manufactured in accordance with Uniform Building Code Standard UBC 21-10, ASTM A951, ASTM A580 – Type 304, ACI 530/ASCE 5/TMS402 Building Code Requirements for Masonry Structures.

Reinforcing shall be units no more than two (2) inches smaller in width than the wall thickness and shall be of deformed rods 3/16" side rods and 9 gage diagonal cross rods all galvanized.

Provide prefabricated Tees and Corners at all wall intersections.

Interior block partitions shall be reinforced similar to exterior walls.

Spacing: Reinforcing for exterior and interior walls shall be 16" o.c. vertically beginning at the finish floor line and provide line of reinforcing one block course and one below all window heads and sills. Extend 16" beyond jambs on each side.

Lap all splices one full panel of reinforcing unit.

WALL TIES TO STRUCTURAL STEEL:

All exterior and interior masonry walls shall be tied to contiguous steel columns and beams with two-piece adjustable tie units such as, Hohmann and Barnard 359 Weld-On Ties; 1/4" diameter x 8" long hot dip-galvanized bent wire, or equivalent column and beam anchors by Wire-Bond or Heckman, with Hohmann and Barnard VBT-Vee Byna-Tie 3/16" diameter hot-dip galvanized triangular wire ties or approved equal by Wire-Bond or Heckman.

Space wall ties to columns and beams at 16" o.c. maximum. Tie anchors shall be welded to structural steel with 4 fillet welds 1/8" x 3/4".

WALL TIES TO LIGHT GAGE METAL WALL STUDS

All exterior masonry veneer with metal stud back up shall be tied to metal studs with two piece adjustable tie units such as Heckman 12 gage 315-D, Hohmann and Barnard 12 gage DW-10HS, or 12 gage Wire-Bond Type III anchors with 3/16 diameter triangular wire ties or approved equal.

Space wall ties so that no tie is required to tie more than 2 2/3 square feet of masonry veneer or 24" oc maximum. Tie anchors shall be attached to metal studs with 2 - #12 self drilling self tapping screws.

FLASHING SYSTEM:

Thru-Wall Flashing system: 40 mil thick EPDM rubber membrane, containing no asphalt, equivalent to Sandell EPDM Rubber Thru-wall Flashing with Carlisle SecurTape splicing tape, and continuous pre-formed stainless steel drip edge. Install in compliance manufacturer's instructions.

Thru-wall flashing shall be completely secured into masonry joints or surface fully adhered throughout all wall assemblies, with all lap joints 100% sealed, in a complete continuous waterproof installation. Provide all necessary accessory components for a complete assembly; to include required roll-on primers, spray adhesives, pressure sensitive adhesive tape, termination bars, etc. wherever necessary.

Locations: Wall flashing system shall be installed over all masonry opening heads and sills, over all lintels in exterior walls, at all weephole locations, continuous around columns, and elsewhere indicated on Drawings.

Build a mock-up installation into the masonry sample panel for review and approval by Architect.

Required Thru-Wall Flashing Accessories:

Carlisle SecurTape Splicing Tape: 3" wide x 100' long roll, double-sided, synthetic cured rubber EPDM adhesive tape, .030" thick. Features a clear poly release film. Apply to cleaned EPDM flashing lap seams and adhere tightly with roller. Primers and spray adhesives shall be applied to surfaces to receive adhesive tape.

Sando-Seal lap sealant: Apply to all exposed edges at surface applied conditions, eliminating any voids, pockets or depressions where moisture would accumulate.

Sandell's S-600 Primer: Manufacturer's special primer formulated to prepare surfaces for adhering flashing to surfaces with pressure sensitive adhesive tape.

Sandell's Self-Adhering End Dams: preformed rubberized asphalt with adhesive surface and release layer film. Install above and beneath all wall openings, all longitudinal ends of flashing, lintel ends, at column abutments, near building expansion joints, and all cavity wall conditions whenever flashing interruptions occur.

Sandell's Self-Adhering Corners: preformed rubberized asphalt with adhesive surface and release layer film. Install at exterior and interior corner conditions. Flashing membrane shall overlap preformed corners, adhere and form a continuous waterproof seal.

Pre-Formed Stainless Steel Drip Edge: Provide a continuous pre-formed stainless steel drip edge at all flashings. 28 gauge, dull finish Type 304 stainless steel, ASTM A-167. Minimum 1 5/8" wide with a 3/8" bent safety drip edge. Flashing membrane shall lap and adhere onto drip edge for a continuous waterproof assembly. Flashing membrane shall be terminated at 1/2" from face of finished wall surface.

Weeps: Plastic weep inserts shall be Cell Vent Weep-Hole Ventilator by DUR-O-WALL or equivalent. 3/8" thick x full head joint height equivalent to actual brick size height, color clear. Install at all wall flashing locations with weepholes indicated on Drawings.

PART 3: EXECUTION

SURFACE CONDITIONS:

Inspection:

Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

Verify that concrete unit masonry may be completed in accordance with all pertinent codes and regulations, referenced standards, and the original design.

Discrepancies: In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been completely resolved.

COORDINATION:

Carefully coordinate with all other trades to insure proper and adequate interface of the work of other trades with the work of this Section.

INSTALLATION OF MASONRY:

GENERAL: Lay up all walls in running bond, plumb, level, and true to the lines and dimensions indicated on the Drawings. Maintain uniform head and bed joint of 3/8" vertically and horizontally. Masonry Contractor shall use sled runner jointing tool wherever possible to maintain consistency.

Do not use chipped or broken units. If any such units are discovered in the finished wall, the Architect may require their immediate removal and replacement with new units at no additional cost to the Owner.

Bullnose CMU shall be begin at floor line, with first unit above floor at a bullnose corner being a bullnose unit, not a square corner unit.

Wetting of Brick: All brick shall be thoroughly wetted as necessary to reduce the rate of absorption of water a time of laying to not more than 0.7 of an ounce (20 grams per minute) per brick when placed on its flat side in 1/4" of water for one minute.

Brick Laying Technique:

All joints between brick shall be completely filled with mortar. Brick shall be laid in a full, lightly furrowed bed of mortar with the head joints completely filled by placing sufficient mortar on the end of the brick so that when the brick is shoved into place, the head joint will be filled. Buttering of face edge and then slushing will not be permitted. All joints, both interior and exterior shall be cut flush.

Disturbed Units: Where brick are disturbed or must be moved after the mortar has begun to lose its moisture, the brick and all adjacent mortar shall be removed and reset completely.

Tooling: Exterior and Interior brick joints shall be tooled to a uniform concave joint (unless otherwise noted) using a metal tool designed for that purpose, head joints first and then the bed joints. Interior CMU joints shall be tooled to a uniform concave joint. All joints shall be tooled at approximately the same degree of moisture content and firmness to achieve a uniform color and texture.

Where indicated provide raked tooled joints.

POINTING OF MASONRY:

At the completion of the masonry work, all holes in the exposed masonry shall be pointed. Defective joints shall be cut out and tuckpointed solidly with mortar. Pointing and tuckpointing shall be done with a pre-hydrated mortar. The mortar mix shall be controlled so that after curing of the mortar, no difference in texture or color exists with that of adjacent masonry. Where indicated, provide tuckpointing of existing masonry.

COLD WEATHER:

No bricklaying shall be performed unless the temperature of the surrounding air is 40 degrees F. and rising. The use of "anti-freeze" or accelerating admixtures is not permitted. Provide temporary protection of completed portions of masonry to insure a minimum 48 hours curing at a minimum 40 degrees F.

MASONRY OPENINGS:

The General Contractor and/or his masonry subcontractor shall be responsible for coordinating and building into all walls, the required openings necessary to permit the passage of duct work and piping by

the mechanical contractors. These required openings shall be located and constructed as the work progresses. Knocking out large openings after work has been constructed will not be permitted. Structural lintels shall be furnished and installed by the General Contractor.

MASONRY CLEANING:

While laying the brick, good workmanship and job housekeeping practices shall be used so as to minimize the need for cleaning the brick. Protect the base of the wall from mud splashes and mortar droppings, protect the wall by setting scaffolds so that mortar is not deflected onto the wall, and at the end of each work day set the scaffolding boards so that they do not deflect rainfall onto newly laid masonry.

The bricklaying technique shall be such that mortar does not run down the face of the wall, or smear the mortar onto the brick face.

After the joints are tooled, cut off mortar tailings with the trowel and brush excess mortar burrs and dust from the face of brick. Do not bag or sack the wall, but use a bricklayer's brush made with medium soft hair.

Remove all large mortar particles with a hardwood scraper.

If after using the above outlined techniques, additional cleaning of the walls is found necessary, allow the walls to cure one month prior to and at the time the cleaning solution is applied.

Clean the wall only with an approved cleaning solution applied as recommended by the manufacturer. The solution shall be applied with a brush starting at the top of the wall. The use of any proprietary cleaning agents shall first be approved in writing by the manufacturer of the masonry being cleaned and the Architect. The concentration, method of application of the cleaning solution, and method of scraping shall be as outlined on the container by the manufacturer.

High pressure water and sandblasting shall not be used for cleaning.

Immediately after cleaning a small area, the wall shall be rinsed thoroughly with quantities of water.

Protect adjacent surfaces and materials during brick cleaning operations.

After the walls are cleaned, take necessary precautions to insure that other contractors and subcontractors do not damage or soil the walls. Mud protection around the base of walls shall be left in place until the final grading work is done.

END OF SECTION

Water Penetration Resistance - Construction and Workmanship

Abstract: This *Technical Note* covers essential construction practices needed to assure water-resistant brick masonry. Procedures for preparing materials to be used in brick construction are recommended, including proper storage, handling and preparation of brick, mortar, grout and flashing. Good workmanship practices are described, including the complete filling of all mortar joints, tooling of mortar joints for exterior exposure and covering unfinished brick masonry walls to protect them from moisture.

Key Words: air space, brick, construction, flashing, initial rate of absorption, joints, mortar, tooling, weeps, workmanship.

SUMMARY OF RECOMMENDATIONS:

General

- Store materials on the job site to avoid wetting and contamination
- For drainage walls, keep the air space free of excessive mortar droppings
- Do not disturb newly laid masonry
- Cover tops of unfinished walls until adjacent construction protects them from water entry

Brick

- Pre-wet brick with a field measured initial rate of absorption (IRA) exceeding 30 g/min•30 in.² (30 g/min•194 cm²)

Mortar

- When mixing mortar, use accurate batching measurements and maximum amount of water that produces a workable mortar
- For brick with an IRA exceeding 30 g/min•30 in.² (30 g/min•194 cm²), increase water or maximize water retention by increasing lime proportions within limits of ASTM C 270
- For brick with an IRA lower than 5 g/min•30 in.² (5 g/min•194 cm²), reduce water or minimize water retention by decreasing lime proportions within limits of ASTM C 270

Joints

- In exterior wythes, completely fill all mortar joints intended to have mortar
- Minimize furrowing of bed joints and prohibit slushing of head joints
- Fill collar joints completely with grout or mortar, preferably grout; do not slush collar joints
- Tool mortar joints when thumbprint hard with a concave, "V" or grapevine jointer

Flashing and Weeps

- Do not stop flashing behind face of brickwork
- Where required, turn up flashing ends into head joint a minimum of 1 in. (25.4 mm) to form end dams
- Lap continuous flashing pieces at least 6 in. (152 mm) and seal laps
- Where installed flashing is pierced, make watertight with sealant or mastic compatible with flashing
- Install weeps immediately above flashing

INTRODUCTION

The best design, detailing and materials will not compensate for poor construction practices and workmanship. Proper construction practices, including preparation of materials and workmanship, are essential to achieve a water-resistant brick masonry wall.

This *Technical Note* discusses construction techniques and workmanship and is the third in a series of *Technical Notes* addressing water penetration resistance of brick masonry. Other *Technical Notes* in the series address brickwork design and details (7), materials (7A) and condensation (7C and 7D). Maintenance of brick masonry is addressed in *Technical Note* 46. All of these items are essential to obtain water-resistant brick masonry walls.

PREPARATION OF MATERIALS

Preparation of masonry materials before bricklaying begins is very important. Specific procedures must be followed to ensure satisfactory performance and avoid future problems. Preparation includes material storage, mixing mortar and grout and, in some cases, wetting the brick.

Storage of Materials

All materials at the jobsite should be stored to avoid contamination. Masonry units, mortar materials, ties and reinforcement should be stored off the ground, preferably in a dry location. In addition, all materials should be covered with tarpaulins or other weather-resistant materials to protect them from the elements.

Wetting Brick

Brick with an initial rate of absorption (IRA) greater than $30 \text{ g/min} \cdot 30 \text{ in.}^2$ ($30 \text{ g/min} \cdot 194 \text{ cm}^2$) at the time of laying tend to draw too much moisture from the mortar before initial set. As a result, construction practices should be altered when using brick with high IRA to achieve strong, water-resistant masonry. The IRA of brick in the field will typically be less than that reported in laboratory tests. Laboratory test results may be used to determine if measuring IRA in the field is necessary. ASTM C 67, Test Methods for Sampling and Testing Brick and Structural Clay Tile, includes a standard procedure for measuring IRA in the field.

A crude method of indicating whether brick need to be wetted prior to placement consists of drawing, with a wax pencil, a circle 1 in. (25.4 mm) in diameter on the brick surface that will be in contact with the mortar. A quarter can be used as a guide for the circle. With a medicine dropper, place 20 drops of water inside this circle and note the time required for the water to be absorbed. If the time exceeds $1\frac{1}{2}$ minutes, the brick should not need wetting; if less than $1\frac{1}{2}$ minutes, adjustments to typical construction practice are recommended.

Specification for Masonry Structures [Ref. 4] requires that brick with an IRA exceeding $30 \text{ g/min} \cdot 30 \text{ in.}^2$ ($30 \text{ g/min} \cdot 194 \text{ cm}^2$) be wetted prior to laying to produce an IRA less than $30 \text{ g/min} \cdot 30 \text{ in.}^2$ ($30 \text{ g/min} \cdot 194 \text{ cm}^2$) when the units are placed. However, execution of this method may be impractical on large-scale construction projects and the contractor may consider other alternatives, as discussed in the following section, Mixing of Mortar and Grout.

If brick are to be wetted, the method of wetting is very important. Sprinkling or dipping the brick in a bucket of water just before laying would produce the surface wet condition which may not be sufficient, as shown in [Figure 1b](#). The units should have a saturated interior, but be surface dry at the time of laying, as shown in [Figure 1d](#).

Satisfactory procedures for wetting the brick consist of letting water run on the cubes or pallets of brick, or placing them in a large tank of water. This should be done the day before the units are laid, or not later than several hours before the units will be used so that the surfaces have an opportunity to dry before the brick are laid. Wetting low-absorption brick or excessive wetting of brick may result in saturation, as shown in [Figure 1c](#). This can cause “bleeding” of the mortar joints and “floating” of the brick.

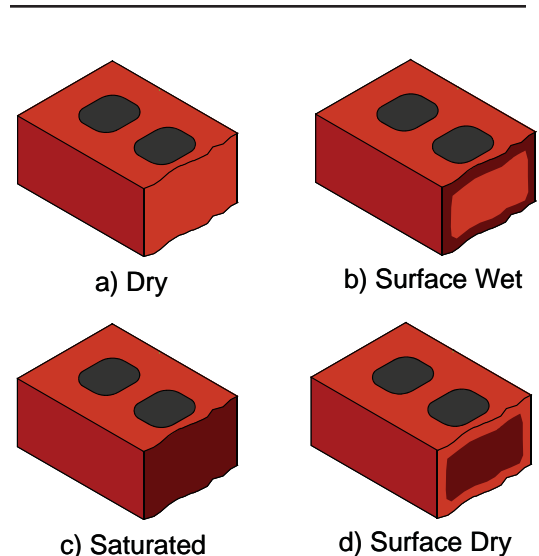


Figure 1
Moisture Content of Brick

Mixing of Mortar and Grout

Typically, a high water content in the mortar is necessary to obtain complete and strong bond between mortar and brick. In general the mortar should be mixed with the maximum amount of water that produces a workable mortar. Factors such as the jobsite environment and the IRA of the brick should be considered when determining the proper amount of water to include in the mortar.

Mortar to be used with brick that have an IRA greater than $30 \text{ g/min} \cdot 30 \text{ in.}^2$ ($30 \text{ g/min} \cdot 194 \text{ cm}^2$) should be mixed to maximize water retention by increasing mixing water or lime content within the limits of ASTM C 270. This is particularly important when pre-wetting the brick to reduce their IRA is impossible or impractical. Admixtures designed to increase the water retention of the mortar may also be used to improve the compatibility of mortar with high IRA brick. Only admixtures with test data showing no deleterious effects should be used.

Mortar for use with brick that have an IRA less than $5 \text{ g/min} \cdot 30 \text{ in.}^2$ ($5 \text{ g/min} \cdot 194 \text{ cm}^2$) should be mixed with reduced amounts of water or lime to minimize water retention. Lime proportions should remain within the limits of ASTM C 270.

When brick with widely different absorption rates are used together in brickwork, it is important to maintain the correct water content in the mortar used with the different brick.

All cementitious materials and aggregates must be mixed for at least 3 minutes and not more than 5 minutes in a mechanical batch mixer. If, after initial mixing, the mortar stiffens due to the loss of water by evaporation, addi-

tional water should be added and the mortar remixed (retempered). All mortar should be used within 2½ hr (2 hr in hot weather conditions, see *Technical Note 1*) of initial mixing and grout should be used within 1½ hour of introducing water into the mix. No mortar or grout should be used after it has begun to set.

One of the most common problems with mortar is oversanding. Oversanded mortar is harsh, unworkable and results in poor extent of bond and reduced bond strength, thus increasing the potential for water penetration problems. The cause of oversanding is frequently the use of the shovel method of measuring the sand. The amount of sand that a shovel will hold varies depending on the moisture content of the sand, the person doing the shoveling and the different size of shovels used on the jobsite. To alleviate this problem, proper batching methods must be used. Measurement of sand by shovel should not be permitted without periodically gauging the shovel count using a bucket or box of known volume. *Technical Note 8B* provides detailed guidelines for various methods of more accurately batching mortar.

Blending of Brick

While not related to water penetration resistance, blending of brick at the jobsite is an important preparation task related to workmanship and the acceptable appearance of brickwork. Because brick is made from natural materials that vary in physical properties, variations in color may occur between production runs and occasionally within the same run. Modern manufacturing processes use automatic equipment which may not permit inspection of each brick, also resulting in minor color and texture variations. For these reasons, straps of brick from different cubes should be placed together around the wall. The mason should then select brick from adjacent straps when laying a given section of brickwork. By blending the brick throughout the wall in this manner, the effect of potential color variations on the finished brickwork is minimized.

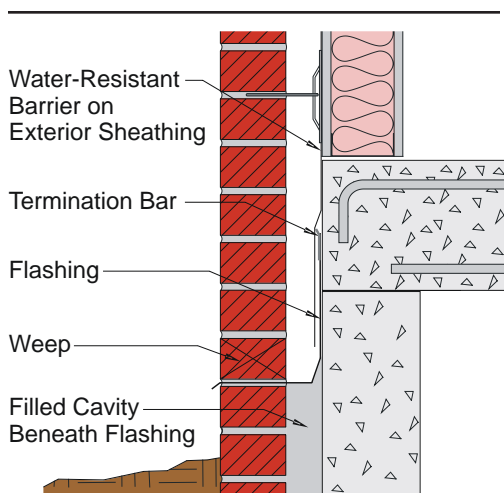


Figure 2
Wall Base Flashing Detail

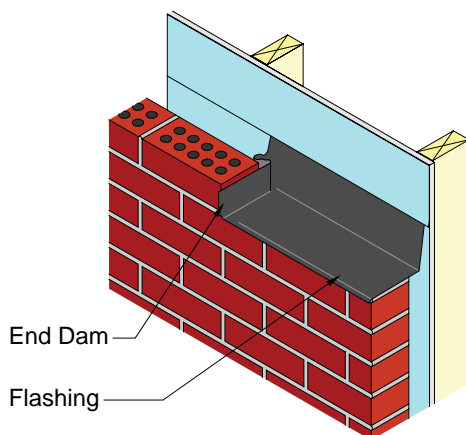


Figure 3
End Dam Detail

WORKMANSHIP

The importance of good workmanship to attain quality brickwork cannot be overemphasized. While design and the quality of materials contribute to the water penetration resistance of brickwork, workmanship is a highly important factor in the construction of water-resistant masonry.

Placing Flashing and Weeps

Flashing must be installed properly and integrated with adjacent materials to form an impervious barrier to moisture movement. The flashing should be wide enough to start outside the exterior face of the brick wythe, extend across the cavity, and turn up vertically against the backing or interior wythe at least 8 in. (203 mm). The top (vertical) edge should be placed in a mortar joint of the backing wythe, in a reglet in concrete backing, or attached to sheathing with a termination bar, as shown in *Figure 2*. Sections of flashing are to be overlapped at least 6 in. (152 mm) and the lap sealed with a compatible adhesive. Water-resistant sheet membranes should overlap the flashing in a shingle fashion by at least 6 in. (152 mm).

Flashing that is placed so that the outside edge projects from the face of the wall may be cut flush with the face of the brickwork. In no circumstances should the flashing be stopped behind the face of the brickwork. Continuity at corners and returns is achieved by cutting and folding straight sections or using preformed corner pieces. Discontinuous flashing should terminate with an end dam in a head joint, rising at least 1 in. (25.4 mm) as shown in *Figure 3*.

Flashing must be placed without punctures or tears. Openings created for reinforcement or anchors must be closed with a compatible sealant. Protection may be needed around bolts fastening shelf angles to the structure.

Weeps are required, and should be formed in mortar joints immediately above the flashing. Open head joints, formed by leaving mortar out of a joint, are the recommended type of weep. Open head joint weeps should be at least 2 in. (51 mm) high. Weep openings are permitted by most building codes to have a minimum diameter of $\frac{3}{16}$ in. (4.8 mm). The practice of specifying the installation of weeps one or more courses of brick above the flashing can cause a backup of water and is not recommended. Non-corrosive metal, mesh or plastic screens can be installed in open head joint weeps if desired.

Spacing of open head joint weeps at no more than 24 in. (610 mm) on center is recommended. Spacing of wick and tube weeps is recommended at no more than 16 in. (406 mm) on center. Weep spacing is permitted by most building codes up to 33 in. (838 mm) on center. If other than an open head joint weep is used, be sure the weep is clear of all mortar to allow the wall to drain (see *Technical Note 21C*). Rope wicks should be flush with, or extend $\frac{1}{2}$ in. (12.7 mm) beyond the face of the wall to promote evaporation. The rope should continue into the bottom of the air space, placed along the back of the brick and be at least 16 in. (406 mm) long.

Filling Mortar Joints

To reduce water penetration, there is no substitute for proper filling of all mortar joints that are designed to receive mortar. Improperly filled mortar joints can result in leaky walls, reduce the strength of masonry, and may contribute to disintegration and cracking due to water penetration and subsequent freezing and thawing.

A uniform bed of mortar should be spread over only a few brick, and furrowed lightly, if at all. Filled joints result when plenty of mortar is placed on the end of the brick to be laid and it is shoved into place so that mortar is squeezed out of the top of the head joint, as shown in [Photo 1](#). After placement, mortar squeezed out of bed joint should be cut off prior to tooling, as shown in [Photo 2](#). When placing closures, plenty of mortar is needed on the ends of brick in place and on the ends of the brick to be laid. The closure should be shoved into place without disturbing brick on either side, as shown in [Photo 3](#).

Bed Joints. A bed joint is the horizontal layer of mortar on which a brick is laid. The length of time between placing the bed joint mortar and laying the succeeding brick influences the resulting bond. If too long a time elapses, poor extent of bond will result. Brick should be laid within 1 minute or so after the mortar is placed.

For solid brick, bed joints should be constructed without deep furrowing of the mortar, as full bed joints (covering the entire bedding surface) are an inherent requirement for water-resistant brick masonry construction. For hollow brick, bed joints may be laid with face shell bedding (mortar placed only on the front and back face shells). Both face shells must be completely covered with mortar.

Head Joints. A head joint, sometimes called a cross joint, is the vertical mortar joint between two brick. For both solid and hollow brick it is important that head joints be completely filled. The best head joints are formed by completely buttering the ends of the brick with mortar and shoving the brick into place against previously laid brick.



Photo 1
Shoving Brick into Place



Photo 2
Cutting Excess Mortar



Photo 3
Placing the Closure

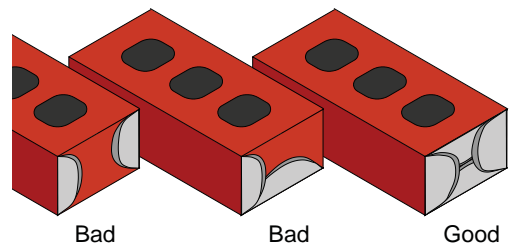


Figure 4
Head Joints



Photo 4
Concave Mortar Joints



Photo 5
"V" Mortar Joints

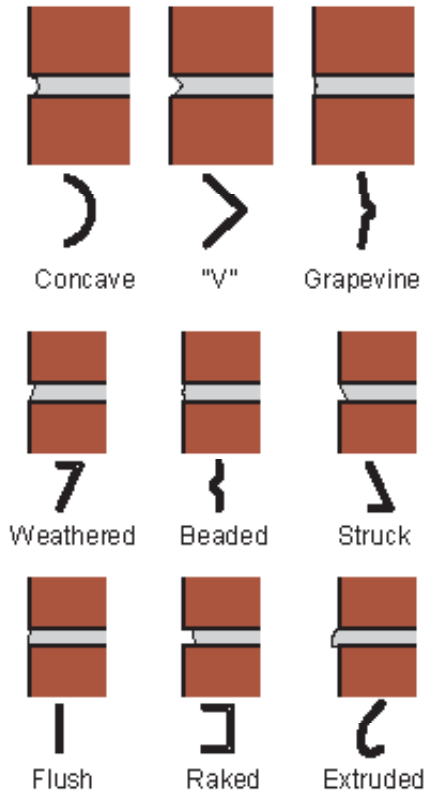


Figure 5
Typical Mortar Joints

"Slushing" ("throwing" mortar into the joint with the edge of a trowel) does not adequately fill joints or compact the mortar, resulting in joints that are less resistant to water penetration. The results of head joint forming are shown in [Figure 4](#).

Tooling of Mortar Joints

Proper tooling, or "striking", of mortar joints helps seal the wall surface against moisture penetration. Mortar joints should be tooled when they are "thumbprint" hard, (pressing the thumb into the mortar leaves an indentation, but no mortar is transferred to the thumb) with a jointer slightly larger than the joint. It is important that joints are tooled at the appropriate time as this affects both their effectiveness and appearance. Joints that are tooled too early often smear and result in rough joints. If tooling is delayed too long the surface of the joint cannot be properly compressed and sealed to the adjacent brick. Each portion of the completed brickwork should be allowed to set for the same amount of time before tooling in order to ensure a uniform mortar shade. Early tooling often results in joints of a lighter color. Later tooling results in darker shades.

Concave, "V" and grapevine joints best resist water penetration in exterior brickwork. These joints produce a more dense and weather-tight surface, as the mortar is pressed against the brick, as shown in [Photos 4 and 5](#). For interior masonry work, other joints such as the weathered, beaded, struck, flush, raked or extruded joints shown in [Figure 5](#) can also be used.

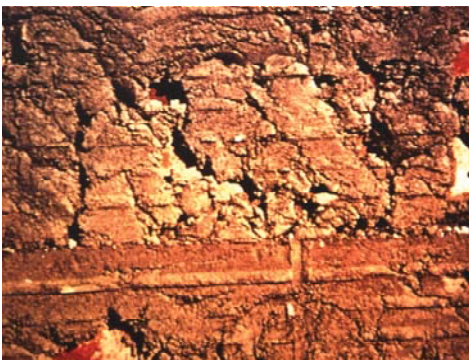


Photo 6
Poorly Filled Collar Joint

Collar Joints

The vertical, longitudinal joint between wythes of masonry is called a collar joint. The manner in which these joints are filled is very important. Grouting is the most effective method of ensuring that collar joints are completely filled. However, grouting spaces less than 3/4 in. (19.1 mm) is not permitted. Mortar protrusions (fins) that extend more than 1/2 in. (12.7 mm) into a cell or cavity that will be grouted must be removed prior to grouting. For mortar-filled collar joints, the outer face of the inner masonry wythe should be parged and the back of brick in the exterior wythe buttered in order to fill the collar joint.

"Slushing" of collar joints is not effective since it does not completely fill all voids in the joint, as shown in [Photo 6](#). Frequently, the mortar is

caught and held before it reaches the bottom of the joint, leaving openings between the face brick and the backing. Even when this space is filled, there is no way to compact the mortar. The mortar does not bond with the brick over its entire surface and channels are left between the mortar and the brick. Some of these channels may allow water to reach the back of the wall. A properly constructed collar joint is completely filled with grout or mortar.

Parging

Parging is the process of applying a coat of portland cement mortar to masonry. Parging the outer face of the inner wythe of a multiwythe wall with Type M or S mortar as damp proofing may help resist rain penetration and can also reduce air leakage. Membranes or liquid-applied materials usually provide superior performance to parging, which will crack if the wythe cracks. However, parging can provide a smooth base for these materials. If parging alone is to resist water penetration, proper curing is necessary to reduce shrinkage cracks. Parging the back side of the exterior wythe is not recommended for drainage-type walls, as this may result in more debris in the air space or break the brick/mortar bond.

The face of the wall to be parged must not have any mortar protrusions. Protruding mortar can cause bond breaks in the parge coat, resulting in a leaky wall. When applied in multiple layers, each should be a minimum thickness of ¼ in. (6.4 mm). The first coat should be allowed to partially set, roughened, and allowed to cure for 24 hours. It is then moistened for application of the second coat. The parged surface should be troweled smooth so that it sheds water easily. When completed in adjacent areas, the edges of the parging should be feathered and new parging should overlap existing parging by a minimum of 6 in. (152 mm). Lap joints should be spaced no closer than 6 feet (1.83 m).

Keeping Air Spaces Clean

In a drainage wall system, such as a cavity wall or an anchored veneer wall, it is essential that the air space be kept clean. If it is not, mortar droppings may clog the weeps, protrusions may span the air space and water penetration to the interior may occur.

To the greatest extent possible, mortar droppings should be prevented from falling into the air space or cavity. An aid to prevent this is to bevel the bed joint away from the air space or cavity, as shown in [Figure 6](#). When brick are laid on a beveled bed joint, a minimum of mortar is squeezed out of the joint, as shown in [Photo 7](#). The mortar squeezed from the joints on the air space or cavity side may be troweled onto the units. This same procedure may be used for laying the exterior wythes of grouted and reinforced brick cavity walls.

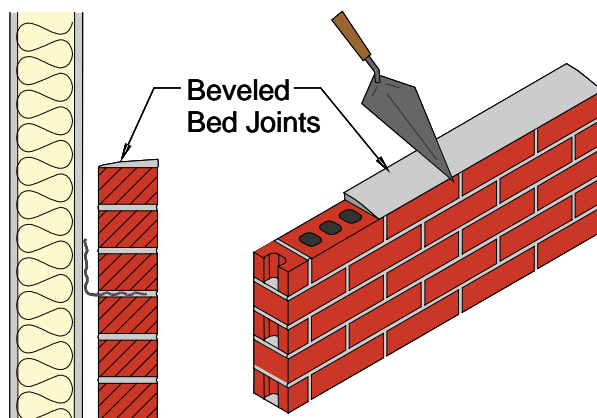


Figure 6
Beveled Bed Joints

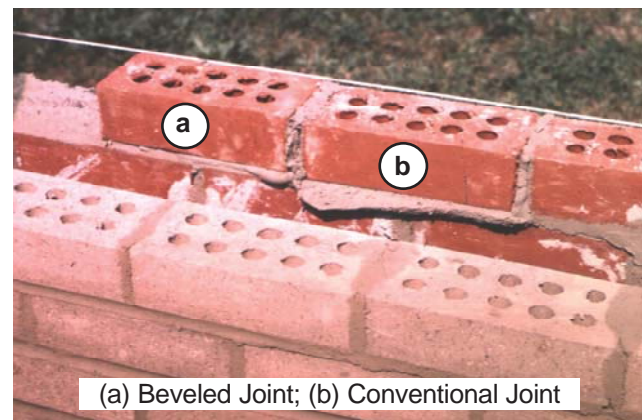


Photo 7
Beveled and Conventional Mortar Joints

Another method allows access to the base of the cavity for cleaning. When the brickwork is initially constructed, every third brick or so in the course above the flashing of the exterior wythe is omitted. Once the brickwork is complete, mortar droppings at the base of the cavity can be easily removed and weeps provided when the omitted brick are placed in the wall with mortar.

Alternately, a wooden or metal strip, slightly smaller than the cavity width, can be placed in the air space. This strip rests on the wall ties as the wall is built. Wire or rope is attached to the strip so the strip can be lifted out as the mason builds the wall. Care should be taken when raising or removing the strip to not disturb the brickwork.

Drainage materials and mortar dropping control devices may also be used to keep the air space adjacent to the weeps free from mortar. Use of these devices does not guarantee that bridging of the air space will not occur, thus the amount of mortar droppings should be limited as much as possible.

Disturbance of Newly Laid Masonry

Newly laid brick should never be pushed, shoved, tapped or otherwise disturbed once they are laid in their final position and the mortar has begun to set. Any disturbance at this point will break the bond and may lead to a leak. If adjustments are necessary, the incorrectly placed brick should be removed and re-laid in fresh mortar.

Protection of Unfinished Brickwork

Covering of masonry walls at the end of each work day, and especially in times of inclement weather, is essential for satisfactory performance. Covering unfinished walls with tarpaulins or other water-resistant materials, securely tied or weighted in position, should be rigorously enforced. Mortar boards, scaffold planks and light plastic sheets weighted with brick should not be accepted as suitable cover. Metal clamps, similar to bicycle clips, are commercially available in a variety of sizes to meet various wall thicknesses. These are used in conjunction with plastic sheets or water-repellent tarpaulins and offer excellent protection for extended periods of time.

Tops of walls should also be covered after the mason's work is finished if a permanent coping is not attached immediately after the brickwork is completed. Protection of openings in brickwork such as those for windows, movement joints, etc. should also be considered as they may allow moisture ingress from rain and snow and can lead to moisture-related problems such as efflorescence, and in some cases could affect the final mortar color.

SUMMARY

Quality construction practices and good workmanship are essential to achieve brickwork that is resistant to water penetration. This *Technical Note* does not cover all construction practices, but describes material storage and preparation procedures, construction practices and installation techniques that are indicative of high quality and, when combined with proper design, detailing and materials, result in brickwork that is resistant to water penetration.

The information and suggestions contained in this Technical Note are based on the available data and the combined experience of engineering staff and members of the Brick Industry Association. The information contained herein must be used in conjunction with good technical judgment and a basic understanding of the properties of brick masonry. Final decisions on the use of the information contained in this Technical Note are not within the purview of the Brick Industry Association and must rest with the project architect, engineer and owner.

REFERENCES

1. *The BDA Guide to Successful Brickwork*, Second Edition, The Brick Development Association, Arnold (a member of the Hodder Headline Group), London, England, 2000.
2. Drysdale, R.G., Hamid, A.A., and Baker, L.R., *Masonry Structures: Behavior and Design*, Second Edition, The Masonry Society, Boulder, CO, 1999.
3. Koski, J.A., "Waterproof the Backup Wythe," *Masonry Construction*, August 1992.
4. *Specification for Masonry Structures*, ACI 530.1-05/ASCE 6-05/TMS 602-05, The Masonry Society, Boulder, CO, 2005.

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

SECTION INCLUDES

- A. Structural steel columns, beams, lintels, trusses, rod bracing, and other steel framing members.
- B. Base plates, column anchor bolts,
- C. Steel to steel connection bolts.

REFERENCES

- A. ASTM A36, A992 –Structural Steel.
- B. ASTM A53 – Grade B Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- C. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.
- D. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
- E. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- F. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
- G. ASTM A325 - High Strength Bolts for Structural Steel Joints.
- H. ASTM A490 - Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.
- I. ASTM A500 – Grade B Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Rectangular Shapes.
- J. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- K. ASTM A572 - High Strength Low Alloy Columbium-Vanadium Steel of Structural Quality.
- L. ASTM F1554 – Anchor Rods
- M. AWS A2.0 - Standard Welding Symbols.
- N. AWS D1.1 - Structural Welding Code.
- O. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings – Allowable Stress Design..
- P. AISC - Specification for Architectural Exposed Structural Steel.
- Q. SSPC - Steel Structures Painting Council.

SUBMITTALS

- A. Shop Drawings:

1. Indicate dimensions, elevations, profiles, sizes, spacing, and locations of structural members, miscellaneous members, attachments, and fasteners.
 2. Connections detailed fully.
 3. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths and returns.
 4. All truss connections shall be fully welded all around. All truss members shall be fully closed so as not to allow moisture to collect inside.
- B. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- C. Mill Test Reports: Submit indicating structural strength, destructive and non-destructive test analysis.
- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- B. Perform Exposed Work in accordance with AISC - Specification for Architectural Exposed Structural Steel.

QUALIFICATIONS

- A. Fabricator: Company specializing in performing the work of this Section with minimum five years documented experience.
- B. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of North Carolina.

FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on Drawings.

PART 2 PRODUCTS

MATERIALS

- A. Structural Steel Wide Flange Members: Certified to ASTM A992 (Fy = 50 ksi).
- B. Plates, Angles, Bars: Certified to ASTM A36 (Fy = 36 ksi)
- C. Rods: to ASTM A36 (Fy = 36 ksi)
- D. Structural Tubing: ASTM A500, Grade B (Fy = 46 ksi).
- E. Pipe: ASTM A53, Grade B (Fy = 35 ksi).
- F. Bolts, Nuts, and Washers: ASTM A325.

- G. Anchor Rods: F1554 Grade 50.
- H. Welding Materials: AWS D1.1; type required for materials being welded.
- I. Headed Shear Studs: ASTM A108 Type B, Fu = 60 ksi.
- J. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7000 psi at 7 days.
- K. Shop Applied Primer - Epoxy Finished Members: One coat of green solvent based inorganic zinc. Shop primer shall be certified to be compatible with the intumescent fireproofing and UL assemblies, and with epoxy systems as applicable and specified. Reference Section 09900.
- L. Shop Applied Primer – Exposed and Intumescent Fireproofed Members: One coat of grey oxide alkyd. Shop primer shall be certified to be compatible with the intumescent fireproofing and UL assemblies, as applicable and specified. Reference Section 09900.
- M. Shop Applied Primer – Cementitious Spray-on Fireproofed Members: Not required to be primed. Shop primer shall be certified to be compatible with the fireproofing UL assemblies.

FINISH

- A. Prepare structural component surfaces required to be shop primed in accordance with SSPC SP-2, SP-3 or SP-6 as applicable for the final finish type. Reference Section 09900.
- B. Shop priming is required for all building interior exposed to view structural steel members. Shop priming not required for structural steel members where steel is to be enclosed and concealed from view in walls and ceilings or encased in concrete or masonry. Shop primer shall be certified to be compatible with the intumescent fireproofing and epoxy systems and applicable UL assemblies. Apply sufficient primer to insure required dry film thicknesses specified. Reference Section 09900.
 - 1. Members finished with epoxy systems: 2-3 mils DFT, SP-6 surface preparation
 - 2. Members finished with alkyd systems: 2 mils DFT, SP-2 or SP-3 surface preparation
- C. Unless otherwise noted, all exposed exterior structural steel members and steel framing shall be hot-dipped galvanized after fabrication to comply with ASTM A123 G60 standards, including but not limited to: steel pipe, structural steel columns (tubes or wide flanged), beams (tubes or wide flanged), connections, steel angle framing. Reference Section 09900 for paint primer and top coats.
- D. Members to receive cementitious spray-on fireproofing are not required to be primed. Shop primer shall be certified to be compatible with the fireproofing UL assemblies.
- E. Top flanges of beams receiving headed shear studs embedded within concrete shall not be primed.
- F. Lintels in exterior walls shall be hot dip galvanized to G60 standards, after fabrication. All seams in built-up members to be hot dip galvanized such as beam and plate lintels shall be seal welded. Field paint lintels as per 09900.

PART 3 EXECUTION

EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify that lay down areas are sufficient, clean, level, and of sufficient strength and stability to support safely members and handling equipment.

HANDLING AND STORAGE

- A. Provide proper equipment too safely off load material to prevent damage.
- B. Provide adequate dunnage and skids to keep steel from getting muddy and dirty.
- C. Store steel in such a manner to prevent the accumulation of water and debris.
- D. Do not erect steel that is muddy or stained with any deleterious material. Clean steel if necessary before erection.

ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- B. Do not field cut or alter structural members without approval of Architect/Engineer.
- C. After erection, clean and prime paint welds, abrasions, and surfaces where shop primer has been disturbed, deteriorated or damaged.
- D. All eaves shall be aligned to be straight and true. All joist extended ends at the eaves and all HSS outriggers at the gables shall be pulled into alignment and securely welded to the continuous edge plate or angle as applicable. Edge plates and angles shall be string lined for straightness.
- E. Gable outriggers shall be accurately laid out to fit under the wide flute of the metal deck and shall be welded to the top of the affected joists. The metal deck shall be puddle welded to the top of the HSS outriggers at 12" o.c. in addition to welding to the supporting joists.
- F. The bent plate ridge plate shall be aligned vertically and horizontally and shall be securely welded to the ends of the joist extended ends to form straight and level ridge.
- G. The continuous eave bent plates and gable edge angles shall be butt welded straight and full strength at joints. Provide a break in the continuous bent plate and angle members over supports at maximum 40 foot intervals. The minimum length of these members shall be 20 feet. These break joints shall be over a support and shall be welded thereto.
- H. Grout under column base plates to get full uniform bearing.

FIELD QUALITY CONTROL

- A. Field inspection will be performed by the Architect.
- B. All connection bolts and field welds shall be inspected by an independent testing lab selected by the owner and paid by the contractor from the material testing allowance.
- C. All steel beam to beam, beam to column, brace connections, and joist girder to column. Joists to joist girder, and joists to column connection bolts shall be tightened to A15C turn of the nut criteria.

- D. Shop welds and fabrication quality shall be certified by the materials testing laboratory. At the option of the lab the inspection may be conducted in the field after delivery or at the fabrication plant during fabrication and/or prior to shipment.
- E. All structural steel members shall be inspected by the testing laboratory for sweep, camber, and twist to comply with ASTM A6 and AISC Code of Standard Practice for fabricated structural steel. Types of weld tests and frequency of tests shall comply with AWS D1.1 - Structural Welding Code, 2006 Edition.
- F. All out of tolerance members shall be corrected prior to erection by the contractor.
- G. All connections with misfitting bolts shall be field welded as directed by the inspector to fully compensate for the strength of the misfitting bolts.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

1.1 SECTION INCLUDES

- A. Cold-formed structural metal stud framing at exterior and interior wall locations.
- B. Framing accessories

1.2 REFERENCES

- A. ASTM A36 Standard Specification for Carbon Structural Steel.
- B. ASTM A123 Zinc (Hot—Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A1003 Standard Specification for Steel Sheet, Carbon, Metallic and Nonmetallic-Coated for Cold-Formed Framing Members.
- D. ASTM A525 General Requirements for Steel Sheet, Zinc—Coated (Galvanized) by the Hot—Dip Process.
- E. ASTM A591 Steel Sheet, Cold—Rolled, Electrolytic Zinc—Coated.
- F. ASTM C645 Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board.
- G. ASTM C754 Installation of Steel Framing Members to Receive Screw—Attached Gypsum Wallboard, Backing Board, or Water—Resistant Backing Board.
- H. ASTM C1513 Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- I. COSP Specification for the Design of Cold-Formed Steel Structural Members, Code of Standard Practice.
- J. GA 203 Installation of Screw Type Steel Framing Members to Receive Gypsum Board.
- K. Metal Framing Manufacturers Association (MFMA) Guidelines for the Use of Metal Framing.
- L. SSPC (Steel Structures Painting Council) Steel Structures Painting Manual.

1.3 SYSTEM DESCRIPTION

- A. Metal stud framing system for exterior walls shall be structural studs, as noted on Drawings, as manufactured by Marino\Ware, Dietrich, Unimast, Clark Metal Framing Systems or approved equal. Refer to Drawings for metal stud sizes and thickness.
- B. Refer to drawings for interior metal stud sizes and gages.
- C. Design and size connection components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with the current North Carolina State Building Code wind loading requirements.
- D. Maximum Allowable Deflection: 1/600 span.
- E. System to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
- F. Wall studs shall align in straight and true lines.

1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings to indicate plans, elevations, prefabricated work, component details, stud layout, framed openings, anchorage to structure, bracing,

connection details, type and location of fasteners, weld lengths and locations, and accessories and finishes, or items required of other related work.

Show and describe method for securing studs to tracks, splicing, and for blocking and reinforcement to framing connections.

- B. Product Data: Provide manufacturer's product data and technical data sheets describing standard framing member materials and finish, product criteria, load charts, limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Delegated Design Submittals: Submit structural calculations as follows:
 - a. Structural calculations for connections and attachments, prepared by manufacturer for approval, sealed by a professional engineer registered in the State in which the project is located.
 - b. Description of design criteria.
 - c. Selection of framing connection requirements.
 - d. Verification of attachments to structure and adjacent framing components.
- E. Welder's current certifications for light gauge metal framing.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with MFMA and ASTM C754.

1.6 QUALIFICATIONS

- A. Manufacturer:
 - a. Having [5] years of experience manufacturing components similar to or exceeding requirements of project.
 - b. Having sufficient capacity to produce and deliver required materials without causing delay in work.
- B. Manufacturer's Structural Engineer:
 - a. Professional engineer registered in the state in which the project is located.
 - b. Having a minimum of five years of experience with projects of similar scope.
- C. Installer: Acceptable to the manufacturer, experienced in performing the work of this section with minimum five years documented experience, and specialized in installation of work similar to that required for this project.
- D. Welders: Certified by the AWS within the previous 12 months.

1.7 COORDINATION

- A. Coordinate with all trades the placement of components within the stud framing system to provide a totally sound and complete system installation ready to receive sheathing and wallboard.

PART 2: PRODUCTS

2.1 STUD FRAMING MATERIALS

- A. Studs: ASTM A525, ASTM A591, cold rolled steel, channel shaped, punched for utility access
 - 1. Depth: 8", 6", 3 5/8", and as shown on the drawings.
 - 2. Thickness: 68 mil minimum at 8" and 6" studs and 33 mil minimum 3 5/8" studs.
 - 3. Width minimum 1 5/8" with 1/2" stiffening return both flanges.
- B. Runners: Of same material and thickness as studs unless otherwise noted.
- C. Furring and Horizontal CRC Bracing Members: Of same material as studs; thickness to suit purpose.
- D. Vertical Deflection Clips and Tracks: Manufacturer's standard clips and tracks, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to studs.
- E. Fasteners: Stainless steel or zinc coated #12 pan head, self-drilling, self tapping screws.
- F. Anchorage Devices: Powder actuated fasteners and screws as shown on drawings.
- G. Touch Up Primer for Galvanized Surfaces: SSPC — Paint 20 Type I Inorganic.

2.2 JOIST FRAMING

- A. Steel Floor and Ceiling Joists: Cold-formed steel joists, of web depths indicated on Drawings, as follows:
 - a. Type as indicated on Drawings.
 - b. Minimum Base Metal Thickness: As indicated on the Drawings.
 - c. Section Properties: As indicated on the Drawings.
- B. Steel Joist Track: Cold-formed steel joist track, of web depths indicated, unpunched, with unstiffened flanges. Type as indicated on the Drawings. Minimum Base Metal Thickness: Match steel joists. Flange Width 1 1/4 inches, minimum.

2.3 ACCESSORIES

- A. Framing Connectors:
 - A. Type: Steel-framing accessories fabricated from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
 - B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Web stiffeners, solid blocking, utility angles, joist hangers, gusset plates, rigid clips, breakaway clips.

C. Anchors, Clips and Fasteners

1. Steel Shapes and Clips: ASTM A36/A36M and zinc coated by hot-dip process according to ASTM A123/A123M.
2. Cold-formed Steel Connections: ASTM A653/A653M, zinc coated by hot-dip process according to ASTM A123/A123M.
3. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E488.
4. Powder-actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E1190 and as indicated on the drawings.
5. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
6. Welding Electrodes: Comply with AWS standards.
7. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
8. Shims: Load bearing, high-density multimonomer plastic, non-leaching.
9. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.4 FABRICATION

- A. Fabricate cold-formed metal framing and accessories assemblies of framed sections to sizes and profiles required; with framing members fitted, plumb, square, and true to line, reinforced, and with connections securely fastened, and braced to suit design requirements, in accordance with referenced specification standards, and manufacturer's written instructions, and requirements in this Section.
- B. Fit and assemble in largest practical sections for delivery to site, ready for installation.
- C. Studs shall bear tightly against the top and bottom tracks.
- D. Fabricate framing assemblies using jigs or templates.
- E. Cut framing members by sawing or shearing; do not torch cut.
- F. Fasten cold-formed metal framing members by welds, screw fasteners, clinch fasteners or rivets as standard with fabricator. Do not wire-tie framing members.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

- c. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

2.5 FINISHES

- A. Studs: Galvanize to G60 coating class (minimum) or as indicated on Drawings.
- B. Tracks and Headers: Galvanize to G60 coating class (minimum) or as indicated on Drawings.
- C. Accessories: Same finish as framing members.

PART 3: EXECUTION

3.1 EXAMINATION

- A. Verify that conditions are ready to receive work.
- B. Verify that rough-in utilities are in proper location, and coordinated with framing.

3.2 ERECTION

- A. General:
 1. Erect in accordance with ASTM C1007 and manufacturer's installation instructions.
 2. Field Welding: Per AWS D1.3, and the following:
 - a. Stud-to-Track Connections: 1/2 inch (13 mm) fillet weld, full length of inside flange dimension, inside each flange of stud onto track web.
 - b. Other Connections: Flat, plug, butt or seam.
 - c. Minimum Steel Thickness for Welded Connections: 18 gauge.
 - d. Field Fastening: Minimum of 2 self-tapping metal screws per connection, unless otherwise indicated.
- B. Wall Systems:
 1. Align and secure top and bottom runners.
 2. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
 3. Install studs vertically uniformly at the spacings shown on the drawings.
 4. Align stud web openings horizontally.
 5. Secure studs to tracks using screws or welding.
 6. Stud splicing not permissible.
 7. Fabricate corners using a minimum of three studs.

8. Minimum double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings. Refer to drawings for additional jamb and head conditions.
 9. Brace stud framing system rigid.
 10. Coordinate erection of studs with requirements of doorframes, window frames, and; install supports and attachments.
 11. Coordinate installation of wood bucks, anchors, and wood blocking with electrical and mechanical work to be placed within or behind stud framing.
 12. Blocking: Secure wood blocking to studs. Secure steel channels to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, etc. as required by Architect.
 13. Coordinate placement of insulation in stud spaces made inaccessible after stud framing erection.
 14. Fabricate and install headers at openings as indicated on Drawings.
 15. All multiple members shall be stitch welded together with 1" seam welds spaced at 16" oc maximum both sides of members to form a totally composite member. Multiple members in composite units shall not be spliced.
 16. All connections not shown on the drawings shall be designed by the supplier to support the imposed loads.
 17. Provide continuous 2" x 43 mil horizontal strap bridging at 48" maximum intervals on both flanges. Install with 1 screw per stud. Provide solid blocking using a piece of metal stud between studs at each end of bridging run and at 12' oc maximum. Terminate bridging at wall openings with solid blocking bridging as required.
 18. Place one stud tightly against each side of the tubular steel columns in line with the wall. Align the face of stud flush with face of tubular columns for smooth finish application for dry wall and sheathing. Fasten stud to column with powder actuated fasteners spaced at 16" oc.
 19. Touch-up field welds and damaged galvanized surfaces with primer.
- C. Steel Joists:
1. Locate joist end bearing directly over load bearing studs or provide approved load-distributing member to top of stud track.
 2. Provide web stiffeners at reaction points where indicated in drawings.
 3. Provide joist bridging as shown in drawings.
 4. Provide end blocking where joist ends are not otherwise restrained from rotation.
 5. Place joists at maximum 12 inches on center and not more than 2 inches from abutting walls. Connect joists to supports using mechanical fastener method.
 6. Touch-up field welds and damaged galvanized surfaces with primer.

3.3 ERECTION TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation of any Member from Plane: 1/4 inch.
- C. Maximum Variation From Plumb: 1/4 inch in 10' height.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Work of this Section shall consist of all labor and materials required to provide all miscellaneous fabricated metal items scheduled on Drawings and specified in this Section.

Miscellaneous metal items for which drawing information is fully descriptive that are not necessarily named herein, shall be provided as shown and as required, providing complete assemblies.

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this Section refer to Section 01068.

QUALITY ASSURANCE:

Manufacturers:

Standard: For purposes of designating type and quality for work under this Section, Drawings and Specifications are based on products manufactured or furnished by Manufacturers listed for each item.

SUBMITTALS:

Shop Drawings: Submit shop drawings in quadruplicate to Architect in accordance with GENERAL CONDITIONS for approval of all fabricated miscellaneous items. Shop drawings shall indicate following: fabrication, assembly and erection details, sizes of all members, fastenings, supports, and anchors; patterns; clearances, and all necessary connection to work of other trades.

Catalog Cuts: For standard manufactured items, catalog cuts may be submitted as specified in GENERAL CONDITIONS, providing all technical performance characteristics and other pertinent information are given.

PRODUCT HANDLING:

Handling and Storage: Handle all materials carefully to prevent damage and store at site above ground in covered, dry locations.

Replacement: Damaged items that cannot be restored to like-new conditions shall be removed and replaced at no additional cost to Owner.

PART 2: PRODUCTS

BASIC MATERIALS:

Structural Shapes: ASTM A 36/A572 Dual Certified.

Steel Pipes: ASTM A 72 welded wrought iron pipe, standard weight, Schedule 40.

Steel Pipes: ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products

Steel Tubing: ASTM A 500, Grade B.

Cast Iron: ASTM A 48j, Class 30, with minimum tensile strength of 30,000 psi.

Zinc-coated iron or Steel Sheets: ASTM A 446.

Cold-rolled Carbon Steel Sheets: ASTM A 366-66.

Aluminum Plate: ASTM B209

Exterior Lintels: ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products

Metal Bar Grating: NAAMM A202.1 Metal Bar Grating Manual

Stainless Steel Sheet: Type #304

FABRICATION:

Measurements: Verify all measurements and take all field measurements necessary before fabrication.

Fasteners: Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with material to which fastenings are applied. Permanent connections shall be riveted, welded or bolted. Exposed welds shall be ground smooth and flush.

Components: Include materials and parts necessary to complete each item properly, even though such work may not definitely be shown or specified.

Provide and install miscellaneous bolts and anchors, supports, braces, and connections necessary for completion of work.

Drill or punch holes for bolts and screws. Poor matching of holes will be rejected. Conceal fastenings where practicable.

Painting and Protective Coating:

All ferrous metal, except stainless steel and galvanized surfaces, shall be properly cleaned and given one shop coat of red lead or zinc chromate primer.

Anchors built into masonry shall be coated with asphalt paint unless specified to be galvanized. Metal work to be encased in concrete shall be left unpainted unless specified or noted otherwise.

Where hot-dip galvanized or zinc-coated metal is specified or shown, it shall not be shop-primed unless specifically required otherwise for paint finish, which shall require bonderized or paint-grip primer. Recoat at all field welds and grindings, and where initial galvanized coating has been removed or deteriorated.

¼" Aluminum Plate shall be factory powder coated finish.

Galvanizing:

Hot-dip galvanizing or zinc coatings applied on products fabricated from rolled, pressed and forged steel shapes, plates, pipes, bars and strips shall comply with ASTM A 123-68.

Unless otherwise noted, all exposed exterior structural steel members and steel framing shall be hot-dipped galvanized after fabrication to comply with ASTM A123 G60 standards, including but not limited to: steel pipe, structural steel columns (tubes or wide flanged), beams (tubes or wide flanged), steel angle framing, connections. Reference 09900 Paint for paint primer and topcoats requirements.

Lintels in exterior walls shall be hot dip galvanized to ASTM A123 G60 standards after fabrication. Reference 09900 Paint for paint primer and topcoats requirements.

Exterior handrails shall be hot dip galvanized to ASTM A123 G90 standards, not less than .90 oz/square foot, after fabrication.

Exterior steel stair treads, unless otherwise noted, shall be hot dip galvanized to ASTM A123 G90 standards, not less than .90 oz/square foot, after fabrication.

Steel bar grating, unless otherwise indicated shall be hot dip galvanized to ASTM A123 G90 standards, not less than .90 oz/square foot, after fabrication.

MISCELLANEOUS ITEMS:

Supplementary Structural Steel: All structural framing incorporated in building design and detailed on Architectural Drawings, but not shown on Structural Steel Drawings, shall be furnished as part of miscellaneous metal work.

Miscellaneous Lintels, Shelf Angles, Beams and Plates, Brackets: Provide miscellaneous lintels and shelf angles, beams, plates, and brackets as indicated.

Lintels shall have 8" bearings at each end unless shown otherwise.

Weld or bolt members together where so indicated, to form complete composite assembly. Set beams on plates as indicated.

Where shelf angles are attached to concrete with bolts and adjustable inserts, provide slotted holes of proper size and spacing in vertical leg of shelf angles.

Miscellaneous Fasteners: Furnish all bolts, nuts, anchor bolts, plates, anchors, ties, clamps, hangers, nails, spikes, screws, straps, toggle and expansion bolts, and other items of rough hardware of sufficient size and number to tie together various parts of building and secure all of its parts in place. Such miscellaneous items shall be of same material as metals they contact.

Supports, Bracing:

Furnish and install all bracing and suspension type supports, fastened to structure, for following and additional conditions, as may be required.

1. Exterior soffits
2. Head of exterior doors and window wall

Handrails: Provide pipe handrails as detailed, fabricated from 1-1/2 O.D. pipe. Weld all joints and grind smooth. Fabricate entire assembly carefully in accordance with details. After installation, use wire brush, sand blast, or otherwise treat to provide completely smooth surface for application of paint. Interior wall handrails consist of straight sections of black steel pipe, mounted on wall brackets. Install brackets with approved anchoring device. Close ends with molded end closures.

All exterior handrails shall be G-90 hot dipped galvanized. All welds and grindings to be recoated on site with a field applied galvanizing coating to match.

Exterior ladders shall be G-60 hot-dipped galvanized.

PART 3: EXECUTION

WORKMANSHIP:

Ferrous metal surfaces shall be clean and free from mill scale, flake rust and rust pitting; well formed and finished to shape and size, with sharp lines and angles and smooth surfaces.

Castings shall be of uniform quality, free from blow-holes, porosity, hard spots, shrinkage distortion or other defects. Castings shall be smooth and well cleaned by shot-blasting or other approved method. Covers subject to street or foot traffic shall have machined horizontal bearing surfaces. Provide machined bearing or contact surfaces for other joints where indicated or required.

COORDINATION: At proper time, deliver and set in place items of metal work to be built into adjoining construction.

PAINTING: Finish painting of items not factory painted shall be as specified in Section 09900.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Work of this Section shall consist of all labor and materials required to provide all rough carpentry work scheduled on Drawings and specified herein.

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this section refer to Section 01068.

CODE COMPLIANCE:

All framing to comply with the current edition of the Building Code having jurisdiction in North Carolina.

QUALITY ASSURANCE:

Manufacturers:

Standard: For purposes of designating type and quality of work under this Section, drawings and Specifications are based on products manufactured or furnished by Manufacturer listed for each product.

COORDINATION WITH OTHER TRADES: Coordinate locating of nailers, furring, grounds, and similar supports for other trades so that installation of finish work may be properly executed to fulfill design requirements.

MOISTURE CONTENT OF LUMBER: Maximum moisture content for lumber products shall be 19 percent on air dried stock, and 15 percent maximum on kiln-dried (KD) stock.

DRESSED LUMBER: Surface lumber four sides (S4S) unless specified otherwise for particular products.

DELIVERY AND STORAGE: As soon as materials are delivered to site, place under cover and protect properly from weather. Do not store or erect material in wet or damp portions of buildings or in areas where plastering or similar work is to be executed until such work has been completed and has become reasonably dry.

PART 2: PRODUCTS

FRAMING LUMBER

Various materials for framing shall be of sizes shown and shall conform to Grading Standards of SPIB. All framing material shall be #2 SYP.

Where indicated on the Drawings, provide FRT Fire Retardant Treated lumber.

PLYWOOD or ORIENTED STRAND BOARD MATERIALS: Softwood plywood or OSB sheathing shall conform to requirements of U. S. Product Standard PS 1-66, Construction and Industrial. All plywood or

OSB sheathing which has any edge or surface permanently exposed to weather shall be "EXTERIOR" type.

Where indicated on the Drawings, provide FRT Fire Retardant Treated plywood.

Where indicated on the Drawings, provide PT Preservative Treated plywood.

PRESERVATIVE TREATED WOOD PRODUCTS: Protective pressure treatment of lumber or products shall be .40 pcf retention of chromated copper arsenate as produced by Wolman, Osmose, Boliden or approved equal. Material shall be treatment grade marked, for ground contact, kiln dried not to exceed 19%, and all cut ends shall be coated with the same preservative, at job site during construction.

All lumber products in contact or fastened to concrete, concrete masonry or brick masonry to be preservative treated wood products.

FASTENING DEVICES: Anchors and fasteners for securing wood items, unless noted otherwise, shall meet following requirements:

Bolts:

- Bolts, nuts, studs and rivets shall conform to Federal Specifications FF-B-571a and FF-B-575, as applicable.
- Lag screws or lag bolts: Federal Specification FF-B-561b.
- Toggle Bolts: Federal Specification FF-B-588b.
- Screws: Federal Specification FF-S-111b.
- Nails and Staples: Federal Specification FF-N-105a.

All fastening devices used in exterior or concrete construction shall be hot-dip galvanized.

All fastening devices used in Fire Retardant Treated or Preservative Treated lumber and plywood to be corrosion resistant per manufacturer's recommendations.

Ground Anchorage: Wood plugs or nailing blocks are not acceptable for fastening grounds, furring, or blocking to concrete or masonry. Hardened steel nails, expansion screws, toggle-bolts, metal plugs, or metal inserts, as most appropriate for each type of masonry or concrete construction shall be used.

Explosive-Driven Fastenings: Explosive or powder-driven fastenings may be used only when approved by Architect.

PART 3: EXECUTION

GENERAL REQUIREMENTS FOR FRAMING AND BRACING:

Finish: Unless otherwise indicated, use S4S lumber for all framing members.

Size: Unless otherwise indicated, framing shall conform to nominal size requirements shown on Drawings.

Space framing on 16 inch centers, unless shown otherwise on Drawings.

Install required blocking, bracing, or other framing required for support of built-in equipment,

including casework.

INSTALLATION OF WOOD GROUNDS:

Location: Install permanent and temporary wood grounds as indicated for proper execution of work of all trades. Remove temporary grounds when no longer required.

Fastening: Except as otherwise required for special locations, form grounds of kiln-dried southern yellow pine, 1-1/2 inches wide, and of thickness to properly align related items of work. Securely fasten grounds into position by means of nails, brads, bolts, or other methods that will provide maximum results.

Coordination: Coordinate locations, sizes and fastenings of grounds with work of other trades. When grounds are to provide backing for fastening of grilles, fixtures, louvers, and similar items of work, exercise care in installation of grounds to provide for correct installation of those other items of work.

INSTALLATION OF WOOD BLOCKING:

Location: Install all wood blocking required to provide anchorage for other materials. Form to shapes and sizes as indicated or as may be required to accomplish particular installation. Form blocking of sizes shown or of minimum 2 inch thick nominal material.

At location of wall mounted equipment install 2"x 8" blocking unit between properly located studs at height indicated in Finish Hardware Schedule, or where indicated for wall mounted equipment. Install wood blocking behind all cabinets and toilet accessories as required.

Steel: Blocking in conjunction with steel work shall be bolted to steel with bolts, washers and nuts, countersunk where required.

Roofing: Form blocking in conjunction with gravel stops and built-up roofs to shapes as detailed. Anchor with countersunk bolts, washers and nuts.

Anchorage: Wedge, anchor and align blocking to provide rigid and secure installation of both blocking and other related work.

INSTALLATION OF WOOD FURRING:

Location: Provide all free-standing, suspended, solid-anchored, and other types of wood furring as required for receipt, alignment and complete installation of various types of finishing materials.

Spacing: Space furring members as required. Provide headers and other nailing members within furring framework. Install with faces true to line and plumb, using wood shims as necessary.

Fastening: Install furring into position by whatever means required to provide secure, rigid, and correct installation. When necessary, use nailing plugs, power-actuated anchors, toggle bolts, anchor bolts, washers and nuts, nails, and similar fastenings.

CLEANING UP: At completion, remove all excess materials and all debris resultant from operations of work of this Section. Leave entire work in neat, clean condition, satisfactory for receipt of other related items of work to be installed as part of work of other Sections.

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, and Division 1 specifications that apply to the work specified in this Section.

PART 1 - GENERAL

RELATED WORK SPECIFIED ELSEWHERE:

Section 05500 Metal Fabrications

DESCRIPTION OF WORK:

Contract work of this Section shall include, but not be limited to providing following:

All sheet metal work required for complete assemblies of items specified at all areas indicated on Drawings, including but not necessarily required:

- Gutters
- Downspouts
- Copings
- Fabricated aluminum plate canopies
- All sheet metal work required for moisture control
- Metal valley flashing
- Metal base flashings and counterflashings
- Ventilation perforated sheetmetal

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this Section refer to Section 01068.

Standards: Workmanship and methods employed for forming, anchoring, cleating, and expansion and contraction of sheet metal work shall conform to application details and description as indicated in current edition of Architectural Sheet Metal Manual, published by Sheet Metal and Air Conditioning Contractors National Association, Inc. and hereinafter referred to as "SMACNA Manual", unless otherwise noted on Contract Drawings or specified herein.

QUALITY ASSURANCE:

Manufacturers:

Standard: For purposes of designating type and quality for the work under this Section, Drawings, and Specifications are based on products manufactured or furnished by Manufacturers listed under PRODUCTS.

SUBMITTALS:

Shop Drawings: Submit for approval in accordance with GENERAL CONDITIONS.

Details and layout shall show weights, gauges or thicknesses of sheet metal, joints, expansion joint spacing, and procedures to be followed during installation. Indicate bolt size and spacing, nailers or blocking required to be furnished by others for securing work of this Section.

Catalog Cuts: For Standard manufactured items, catalog cuts may be submitted as specified in GENERAL CONDITIONS.

Guarantee: Installation of all items of this Section shall be guaranteed to be leak-free for period of five years from date of acceptance of project. Any repairs or replacements required to maintain waterproof installation shall be done at no cost to Owner.

PRODUCT HANDLING:

Handling and Storage: Damaged items that cannot be restored to like-new condition shall be removed and replaced at no additional cost to Owner.

PART 2 - PRODUCTS

MATERIALS:

¼" Aluminum plate Canopy, with powder coat finish. See DRAWINGS.

Flatwork, Flashings, Copings, Gutters and Gravel Stops: Pre-finished .032" aluminum sheet, minimum yield of 50,000 PSI.

Gutter: .032" aluminum gutter. Provide pre-finished gutter spacers and brackets as shown on Drawings.

Finish: Premium fluorocarbon coating produced with Kynar 500 or Hylar 5000 resin

Downspouts: Downspouts, .040" pre-finished aluminum, Kynar 500 finish. Wall mounting brackets shall be matching material.

ACCESSORIES:

General: Provide all accessories or other items essential to completeness of sheet metal installation, though not specifically shown or specified. All such items shall be of same material or compatible to base material to which applied and gauges shall conform to SMACNA Manual recommendations.

Fasteners: All exposed screws, bolts, rivets and other fastenings for sheet metal, unless otherwise noted, shall be pre-finished stainless steel, and of size and type suitable for intended use. All concealed fasteners shall be RUSPERT metal finish coated, 3-layer corrosion protection coating.

Sealant: Elastomeric polyurethane sealant equal to Sonneborn Sonolastic NP-1. Clean all sheet metal surfaces prior to application with xylene and prime with Primer equal to Sonneborn 733 primer. Follow manufacturer's written product installation guidelines, recommendations and instructions. Color to be selected by Architect.

PART 3 - EXECUTION

CONDITION OF SURFACES:

Proper Surfaces: Surfaces to which sheet metal and flashing are applied shall be even, smooth, sound, thoroughly clean and dry and free from projections or other defects that would affect application. Defects shall be corrected by trades involved before installation of sheet metal work.

INSTALLATION:

Workmanship: Fabricate and install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from waves warps, or buckles, match existing work unless shown otherwise. Exposed edges of sheet metal shall be folded back to form 1/2 inch wide hem on side concealed from view. Finished work shall be free from water leakage under all weather conditions.

Fastenings: Unless otherwise indicated or specified, all fastenings shall be concealed. Installation of and joints of all sheet metal work, including fascia claddings, shall be in accordance with recommendations of SMACNA.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK :

Work of this Section shall require furnishing all labor and materials to provide sealants, non-rated caulking, fire-rated fire caulking, and related primers, including expansion joint fillers, interior and exterior, as shown on Drawings and as specified in this Section.

Caulking and primers required for installation of all work included in Sections for Window Wall, Storefront Systems shall be part of work under that Section and shall be done in accordance with the applicable portions of this Section.

Acoustical caulking for installation of gypsum board is specified in Section 09250.

Required applications of sealants and caulking include, but are not necessarily limited to, following general locations:

- Flashing reglets and retainers.
- Coping Members, Bed and Joints.
- Interior and exterior wall joints around doors and windows perimeters.
- Exterior wall control joints
- Horizontal and vertical interior CMU wall and structural steel joints
- Joints at penetrations of walls, decks and floors by piping and other services and equipment.
- Fire-rated penetrations of walls, decks and floors by piping and other services and equipment.
- Concrete walk and pavement expansion joints
- Exposed interior concrete floor slab control joints

Required applications of joint fillers and gaskets include, but are not necessarily limited to, the following general types of work and locations:

- Expansion joint fillers in structural concrete.
- Exterior wall expansion joint fillers.
- Fire-rated pipe and conduit through penetrations.

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this Section refer to Section 01068.

ASTM E 814 (UL 1479) Standard Tests of Penetration Firestop Systems

ASTM E 1966 (UL 2079) Standard Test Method for Fire Resistive Joint Systems

UL - Underwriters Laboratory

ASTM C 920

Comply with 21 CFR 177.2600 for sealants in contact with food.

LEED SC, U. S. Green Building Council

SCAQMD - South Coast Air Quality Management District

QUALITY ASSURANCE:

Manufacturers:

Standard: For purposes of designating type and quality for the work under this Section, Drawings and Specifications are based on products of Sonneborn BASF Corporation and 3M Corporation.

Source: Products for use on this Project shall be of one Manufacturer, unless noted specifically otherwise.

All sealants shall comply with requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1168.

SUBMITTALS:

Manufacturer's Data: For information only, submit 2 copies of Manufacturer's specifications, installation instructions and recommendations for each type of material required. Include Manufacturer's published data, certifications or laboratory test reports indicating that each material complies with requirements. Show by transmittal that copy of instructions and recommendations has been distributed to installer.

Submit applicable UL Tested Assemblies for each type of fire-rated through penetration and fire-stopping required.

Certifications: Submit written certifications that all primers, backings, and caulking materials are chemically compatible with each other and with the overcoating or topcoating materials.

Submit environmental certifications from Manufacturers of all joint sealant materials products, listing all applicable LEED credits made available by certifications.

Samples:

Caulking and Sealants: Submit samples of interior and exterior caulking compounds and related sealants required for installation. Install 12" samples in the work on site in locations requested by the Architect, for review.

Joint Fillers and Gaskets: Submit 3, 12" long samples of each joint filler or gasket which will be reviewed by Architect for color and texture only. Compliance with all other requirements is exclusive responsibility of Contractor.

Guarantee: Furnish Owner, in care of Architect, guarantee in accordance with requirements of General Conditions for period of three (3) years from date of acceptance of project against defective workmanship and materials, warranting airtightness and water tightness of exterior sealant and installation. Repairs shall be made promptly or material replaced after proper notice at no additional cost to Owner.

PRODUCT HANDLING:

Store and handle materials in strict compliance with Manufacturer's instructions.

Store in original containers until ready for use. Damaged material will be rejected and shall be removed from site.

PART 2: PRODUCTS

JOINT BACKING MATERIAL:

Non-Traffic Joints: Except where otherwise specified, packing shall be closed-cell expanded polyethylene cord or square rod conforming to ASTM D 1752, or closed-cell vinyl type conforming to ASTM D 1667, Grade VE-41.

Floor Joints: Packing shall be closed cell neoprene cord or square rod conforming to ASTM C 509-66T, with minimum shore "A" hardness of 45.

Fire-Rated Through Penetrations: non-combustible rock wool type mineral wool.

NON-RATED CAULKING COMPOUNDS /SEALANTS

Interior Joints: Caulking, other than where sealant is called for, shall be a solvent free, low modulus, one-part silyl-terminated polyether, non-sag sealant. Tack free time shall be minimum 90 minutes. Material shall be butyl-free skinning type, paintable within one hour.

Latex sealants are restricted to use only in non-moving joints in drywall construction.

Sonolastic 150 VLM manufactured by Sonneborn, or approved equal, with 7.24% of post-consumer material recycled content, VOC (volatile organic content) of 2 g/L.

MasterSeal CR-100 two-component self-leveling 100% polyurea control joint filler, for interior exposed and bare concrete floor slab control joints; for Boiler and Mechanical rooms, utility and custodial spaces. Not for use under VCT or carpeting adhered type floor finishes.

Exterior Joints: Caulking for exterior joints other than where other sealant is called for, shall be polyurethane:

Sonneborn NP-1 for wall joints, with 5% of post-consumer material recycled content, VOC (volatile organic content) of 43 g/L.

Sonneborn NP-2 for wall joints, with 5% of post-consumer material recycled content, VOC (volatile organic content) when mixed of 53-80 g/L.

Sonolastic SL-1 or SL-2 for concrete expansion joints in non-vehicular traffic areas, with 5% of post-consumer material recycled content, VOC (volatile organic content) maximum of 104 g/L.

Sonomeric 1 for concrete expansion joints in vehicular traffic areas, with 5% of post-consumer material recycled content, VOC (volatile organic content) maximum of 128 g/L.

Approved equivalent products by Tremco or Pecora are acceptable.

PRIMER:

Type: Primer, where required by Sealant Manufacturer, shall be solution or compound designed to insure adhesion of sealant and shall be compatible with sealant.

Source: Material shall be provided by Sealant or Caulking Manufacturer and shall be selected for compatibility with sealant, with substrate and shall be non-staining.

PRODUCT COMPATIBILITY: All primer, backing, and caulking materials shall be chemically compatible with each other for use as an assembly, and with all surfaces in contact with these materials.

FIRE BARRIER SEALANTS

All fire caulk sealants used for fire barriers shall have been tested and passed the criteria of ASTM E 814 (UL 1479) Standard Tests of Penetration Firestop Systems, ASTM E 1966 (UL 2079) Standard Test Method for Fire Resistive Joint Systems and CAN/ULC-S115 Standard Method of Fire Tests of Firestop Systems. All fire caulk sealants shall meet the requirements of the IBC, IRC, IPC, IMC, NFPA 5000, NEC (NFPA 70), NFPA 101 and NBCC. All fire caulks shall be listed in a tested and published through penetration UL assembly.

3M Fire Barrier Sealant FD 150+: one-component, gun grade, latex based elastomeric sealant. Paintable and repairable; firestops construction joints, and through penetrations. Not acceptable for use with CPVC pipe. VOC (volatile organic content) of <250 g/L.

3M Fire Barrier Silicone Sealant 2000+: one-component, gun grade, natural cure silicone elastomer based sealant; firestops dynamic construction joints, through penetrations, static construction joints, and blank openings. Non-paintable. VOC (volatile organic content) of <32 g/L.

3M Fire Barrier Sealant CP 25WB+: High-performance, one-component, gun-grade, latex-based, intumescent sealant. Paintable, firestops and seals single or multiple through penetrations, blank openings, and static construction joints. Not acceptable for use with CPVC pipe. VOC (volatile organic content) of <1 g/L.

3M Fire Barrier Water Tight Sealant 3000WT: High-performance, one-component, neutral cure, intumescent silicone sealant. Fully cured acts as barrier to water leakage, repairable, firestops single and multiple through penetrations, bottom-of-wall static construction joints, blank openings, VOC (volatile organic content) of <31 g/L.

Provide 3M Ultra GS Wrap Strip where required by the through penetration assembly.

PART 3: EXECUTION

Proper Surfaces: Material in contact with sealant shall be dry, full cured, and free of laitance, loose aggregate, form release agents, curing compounds, water repellents and other surface treatment that would be detrimental to adhesion of sealant.

Masonry shall be cleaned and joints raked to proper depth to receive back-up and sealant.

Concrete shall be finished joints cleaned and fins removed.

Curing: Joints in masonry, concrete and stucco work shall not be sealed until substrate has cured minimum of 28 days.

PREPARATION:

Joint Cleaning: Clean all joints thoroughly, and blow out or vacuum loose particles from joints. Surfaces with protective coatings (such as aluminum) shall be wiped with xylol or methyl ethyl ketone solvent to remove protective coatings and oil deposits.

Sheet Metal: New sheet metal shall be wiped down with copper sulphate solution or with strong acetic acid solution to etch the zinc coating and remove oil and foreign matter from surface.

Joint Design: Coordinate work of other trades so that shape of joint, dimensions, and anticipated movement shall conform to following: (Comply with manufacturer's joint design requirements)

Minimum Width: Opening not less than 1/4" wide.

Minimum Depth: Opening not less than 1/8" deep.

Maximum Movement: The width of the opening shall be at least 4 times its maximum movement.

Width Depth Ratio: Comply with manufacturer's joint design requirements. Unless otherwise required, the depth of the sealant shall be no greater than the width. Depth should be more than 1/8" and not more than 1/2" deep, unless otherwise required by manufacturer.

All caulking joints shall be recessed openings. "Fillet" type caulking into corners will not be acceptable.

Joint Packing: Packing shall be installed in all joints to receive sealant. Packing shall be sized to require 20% to 50% compression upon insertion, and placed in accordance with "Joint Design" paragraph. (In joints not of sufficient depth to allow packing, install polyethylene bond-breaking tape at back of joint). Avoid lengthwise stretching of packing material.

Masking: Apply masking tape where required to protect adjacent surfaces. Adhere tape in continuous strips in alignment with joint edge, and remove immediately after joints have been sealed and tooled.

INSTALLATION:

Application of sealants shall be as recommended by Sealant Manufacturer. Work shall be done with standard handguns or mechanical guns. Extrude sealant through nozzles of such diameter as to allow full bead of material to run into joint, but not to exceed width of joint. Force sealant into joint by tooling to insure full contact with sidewalls and backing.

Locations: Use sealants in locations hereinbefore specified for joints as specified.

Joint Finishing: Unless otherwise indicated, all joints in horizontal surfaces shall be finished flush, all joints in vertical surfaces shall be finished slightly concave in shape. Use tooling stick or knife to strike off excess material, and properly shape bead. Use xylol or toluene to prevent sealant from adhering to tooling stick. Finished bead shall be smooth, even, and free from all wrinkling, air pockets, and foreign matter.

Install expansion joint filler as recommended by Manufacturer. Filler shall be size recommended by Manufacturer for use in the expansion joint erected and shall be installed with special tool and adhesive-lubricant.

CLEAN-UP:

Excess Material: Remove all excess material adjacent to joint by mechanical means and/or with solvent (such as xylol or toluol). Leave work in neat and workmanlike manner.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Work required under this Section consists of providing galvanized hollow metal doors, frames, transoms, mullions, view window frames, and related items necessary to complete work indicated on Drawings and described in these specifications. Provide galvanized steel doors and frames for all openings where reasonably inferable from plan drawings, whether specifically scheduled and detailed or not.

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this Section refer to Section 01068.

Hollow Metal Manufacturers Association, HMMA

QUALITY ASSURANCE:

Manufacturers: Except as otherwise specified herein, all hollow metal doors and frames shall be products of one of following manufacturers, or an equal approved by Architect. Manufacturers shall be certified members of the Hollow Metal Manufacturers Association, HMMA. All doors and frames shall be from the same manufacturer.

- Amweld Bldg. Prod. Div.
- Ceco Corp.
- Curries Company
- Acme Steel Door Corporation
- Pioneer Fireproof Door Co.
- Steelcraft Mfg. Co.

SUBMITTALS:

Shop Drawings: Submit shop drawings, in accordance with GENERAL CONDITIONS, of all items specified herein to Architect for approval. Obtain approval of Drawings prior to proceeding with manufacturing. Shop drawings shall indicate following: elevations of each door type; details of each frame type; location in building for each item; conditions at openings with various wall thicknesses and materials; typical and special details of construction; methods of assembling sections; location and installation requirements for hardware; size, shape and thickness of materials; anchorage; joints and connections; and any additional pertinent information.

General Contractor shall field verify all door and frame sizes, door and frame prep requirements, and hardware prep requirements prior to fabrication.

Samples: Sample of door section indicating edge, top and/or bottom construction, insulation, hinge reinforcement and face stiffening. Sample of frame section showing welded corner joints, welded hinge reinforcements, dust covers and face finish.

PART 2: PRODUCTS

GALVANIZED METAL FRAMES: Except where otherwise scheduled, all frames for doors, shall be formed of galvanized steel to sizes and shapes indicated, to include but not limited to double and single rabbett frame profiles where indicated. Frames shall be combination type with integral trim and fabricated with full welded unit type construction at joints.

Type and Gauges of Metal: Metal for frames shall be commercial quality, cold-rolled, galvanized steel sheets, with clean smooth surfaces conforming to ASTM A 366. Except where other gauges are indicated or specified, frames shall be fabricated from steel, not lighter than following U.S. Standard gauges:

- Exterior frames - 14 gauge
- Interior frames to 3-0 in width - 16 gauge (generally)
- Interior frames over 3-0 in width - 14 gauge

Metal Reinforcements: Provide concealed metal reinforcements for hardware as required. Gauge of metal for reinforcement shall be in accordance with manufacturer's recommendations for type of hardware and the thickness and width of doors to be hung in frame, provided gauges used are not lighter than following:

- Hinge and pivot reinforcements - 7 gauge, 1-1/4"x 10" min. size.
- Strike reinforcements - 12 gauge.
- Flush bolt reinforcements - 12 gauge.
- Closer reinforcements - 12 gauge.
- Surface-mounted hardware reinforcements - 12 gauge.

Workmanship and Design: Finished work shall be strong and rigid, neat in appearance, and free from defects. Fabricate molded members straight and true, with corner joints well formed and in true alignment, and with fastenings concealed where practicable.

Forming Corner Joints: Joints for welded type frames shall be mitered and continuously arc-welded for full depth and width of frame and trim. All contact edges shall be closed tight and all welds on exposed surfaces dressed smooth and flush.

Provisions for Hardware: Wood doors shall be solid core, prefitted. Prepare frames at factory for installation of hardware. Frames shall be mortised, reinforced, drilled and tapped to templates to receive all mortised hardware; frames to receive surface-applied hardware shall be provided with reinforcing plates only. Where concealed overhead door closers are required in frame members, provide necessary additional space, cutouts, reinforcement and provisions for fastenings in heads of frames to receive closers. Provide cover boxes in back of all hardware cutouts. Punch doorframes to receive rubber door silencers; provide three (3) silencers on lock side of single doorframes and one silencer for each leaf in heads of double doorframes. Strike reinforcing box shall not expose screw fasteners.

Wall Anchors: Provide metal anchors of shapes and sizes required for adjoining type of wall construction. Fabricate jamb anchors of steel, not lighter than gauge used for frame. Locate anchors on jambs near top and bottom of each frame and at intermediate points not over 24" apart.

For frames set in masonry provide 10" long, corrugated or other deformed type adjustable anchors at jambs, 4 per jamb.

For frames set in metal stud partitions weld jamb anchor clips to back of frames at jamb. Make provision for securing anchors to steel studs with 1/4" round-head machine screws, nuts and washers, or by welding. Furnish 4 anchors per jamb.

Floor Anchors: Provide floor clips of not less than 16-gauge steel and fasten to bottom of each jamb member for anchoring frame to floor construction. Clips shall be fixed and drilled for 3/8" diameter anchor bolts.

Shipment: Provide temporary steel spreaders fastened across bottom of frames; where construction will permit concealment, leave spreader in place after installation; otherwise remove spreaders after frames are set and anchored.

GENERAL REQUIREMENTS FOR GALVANIZED METAL DOORS:

Type and Gauges of Metal: Metal for doors shall be commercial quality, leveled, cold-rolled, galvanized steel sheets with clean, smooth surfaces, conforming to ASTM A 366-68. All units shall be galvanized. Gauges of face sheets shall be as specified for door types.

Hardware Reinforcements: Doors shall be mortised, reinforced, drilled and tapped at factory for fully templated hardware only, in accordance with approved hardware schedule and templates provided by Hardware Contractor. Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only; all drilling and tapping shall be done by others. Steel doors for locksets shall have welded box reinforcements.

All hardware furnished by Hardware Supplier for single-acting doors shall be designed for beveled edges as specified.

Edge Profiles shall be provided on lock stiles of doors as follows:

- Single-acting swing doors - beveled 1/8" in 2".
- Opposite swing double doors - beveled 1/8" in 2".

Provide clearances as follows:

Between doors and frames; at head and jambs - 1/8".

At doorsills; where no threshold is scheduled - 3/8" maximum. Allow for carpet height where required.

At doorsills; where threshold is scheduled - 1/4" maximum between door bottom and threshold.

Between meeting stiles of pair of doors - 1/8".

Workmanship: Finish work shall rigid, neat in appearance, and free from defects. Form molded members straight and true, with joints coped or mitered, well formed, and in true alignment. All welded joints on exposed surfaces shall be dressed smooth so that they are invisible after finishing.

GALVANIZED FLUSH DOORS:

Construction: Construct doors of two outer steel sheets not lighter than 18 gauge, with edges welded and finished flush. Seams or joints will not be permitted on door faces or edges. Reinforce the outer face sheets with 20-gauge interlocking vertical channels of Z-shaped members spaced not over 6" apart and spot-welded to outer face sheets. All doors shall have galvanized steel faces and rails.

Cap tops of exterior doors to prevent the accumulation of water.

Reinforcement: Provide continuous reinforcing channels welded to face sheets at top and bottom of door. Place cork, fiberboard, or mineral wool board in spaces between reinforcing channels.

Moldings shall be not lighter than 18-gauge steel. Doors shall be prepared to receive hardware specified under HARDWARE Section.

Optional Construction: Continuous truss-formed inner core of sheet metal, not lighter than 28-gauge, may be substituted for reinforcing specified, provided it is spot-welded to face sheets every 2-3/4" horizontally and vertically over entire surface of both sides.

Provide metal insect screening on louvered doors.

APPROVED FIRE DOORS AND FRAMES:

Provide approved hollow metal fire doors and frames at locations indicated in Door Schedule. Approved doors, frames and hardware shall be constructed and installed in accordance with requirements of Underwriter's Laboratories for Class of door opening indicated or specified.

Fire doors and frames which bear Underwriter's label for class of opening indicated will be only basis of acceptance.

SHOP PAINTING / GALVANIZING:

All interior and exterior doors and all interior and exterior frames shall be galvanized.

Apply primed finish to all galvanized metal surfaces furnished in this Section.

Clean and chemically treat metal surfaces to assure maximum paint adherence; follow with dip or spray coat of rust-inhibitive metallic oxide, zinc chromate, or synthetic resin primer on all exposed surfaces.

Finish surfaces shall be smooth and free from irregularities and rough spots.

Approved primer shall be compatible with finish coats specified in Section 09900.

LOCATION OF HARDWARE: Location of hardware for hollow metal doors and frames shall be as specified in Section 08700.

PART 3: EXECUTION

ERECTION:

Hollow metal shall be erected by skilled workers. Frames shall be carefully plumbed and aligned. Trim and glazing stops shall be coped or mitered with hairline fit. Brace frames until permanent anchors are set. Anchor bottoms of frames to floor with expansion bolts or with power fasteners.

In application of glazing beads, or other trim parts, exercise care to avoid running screws or other fasteners tightly enough to dimple metal.

Minor damage to metal, incurred during erection, may be repaired by filling with lead or lead alloy ground smooth and flush, if strength and appearance of finish work are not impaired, and if Architect approved. Otherwise, furnish new material.

PROTECTION AND CLEANING:

Protect doors and frames from damage during transportation and at job site. Store at site under cover on wood blocking or on suitable floors.

After installation, protect doors and frames from damage during subsequent construction activities.

Damaged work will be rejected and shall be replaced with new work.

Upon completion, metal surfaces of doors and frames shall be thoroughly cleaned, ready for paint finish by others.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART I: GENERAL

DESCRIPTION OF WORK:

Work of this Section shall include furnishing, delivering, and storing where directed at site, the following:

Solid Core Wood Doors, as shown on drawings and specified herein. Intent of drawings and specifications is to provide all wood doors for the entire project as indicated on plans, whether specifically scheduled or not. Provide wood doors for all openings where reasonably inferable from plan drawings.

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this Section refer to Section 01068.

SUBMITTALS:

Submit complete schedule indicating dimensions, cutouts, hardware sets, species, and other pertinent data, which references the individual architectural door mark number as shown on the plan sheets.

General Contractor shall field verify all door and frame sizes, door and frame prep requirements, and hardware prep requirements prior to fabrication.

Submit Manufacturer's data sheets, completely describing door construction, WDMA I.S. 1-A (formerly NWWDA) and AWI Classifications.

Door Supplier to submit written certification on the supplier's letterhead that the doors provided shall conform to every aspect of this specification.

Door physical finish samples shall accompany submittals. The samples will show the range of color variation.

Warranty statement shall accompany the submittal.

QUALITY ASSURANCE:

Flush wood veneer doors shall conform to the latest edition of the following standards: WDMA I.S. 1-A requirements for "Premium Grade".

Tolerances for warp, telegraphing, squareness, and prefitting dimensions as per the latest editions of WDMA I.S. 1-A, AWI Section 1300 and NFPA 80 1-11.4, 1999 edition.

Each door shall bear an identifying label indicating the manufacturer, door number and order number, as well as fire rating where applicable.

Where fire rated doors are required, provide doors labeled by ITS/Warnock Hersey International. Construction details and hardware application shall be as approved by the labeling agency.

Provide doors to meet UBC 7-2-1997 requirements for positive pressure opening assemblies in areas where this has been adopted by local authorities having jurisdiction.

MANUFACTURERS:

Standards: For purposes of designating type and quality for work under this Section, Drawings and Specifications are based on 5-ply door products meeting WDMA I.S. 1-A Premium Grade manufactured or furnished by Marshfield Door Systems.

Acceptable Manufacturers: Products of following manufacturers, meeting all requirements of these specifications, will also be acceptable.

- Marshfield
- Eggers Doors
- Oshkosh
- Algoma
- VT Industries

Samples: Sample corner section of door indicating edge, top/and/or bottom construction, core and hardware reinforcement.

Color Samples: Provide physical color samples in the veneer species specified, in the full range of manufacturer's standard colors.

Certificates: Provide certificate from manufacturer stating compliance with these specifications.

Guarantee: Provide guarantee for life of installation. Any defects noted during warranty period shall be corrected at no cost to the building Owner. Such corrective work shall include all labor and material for repair, replacement, refinishing and rehangng as required.

PRODUCT HANDLING:

Storage: Store doors at site so as to raise edges off floor and away from walls, letting air circulate freely. Store in enclosed area free from excessive heat, cold and humidity. Do not install scratched, dented or otherwise damaged doors in work.

Packaging: Door Manufacturer shall package doors in a manner to provide protection until they are installed.

Coordination: Provide Door Manufacturer with following:

- Two (2) copies of approved door schedule and Shop Drawings.
- Two (2) copies of the approved hardware schedule.
- One (1) copy of floor plan of building, showing Architect's marks and opening identification.
- Two (2) sets of templates for applicable locks, hinges and other finish hardware.

PART 2: PRODUCTS

SOLID CORE DOORS:

Construction: Doors shall be flush type, solid core, 5-ply, Premium Grade, Type PC-5ME. Seven-ply and non-bonded core construction not accepted. Doors shall be 1-3/4" thick and shall be widths and height shown on door schedule. All doors between use areas and corridors and all smoke doors shall be 20 minute fire rated unless required to be of higher rating.

Veneer: Face veneer to be plain sliced red oak, "A" grade, book and running matched, factory finished.

Finish: Doors to be factory stained and prefinished, delivered to job in protective wrapping. No doors shall be hung until finish work is complete.

Top and bottom rails shall be factory sealed with an approved sealer.

Core shall be of one piece slab, particle board, density 28-32 lb. per cu. ft. or greater bonded to stiles and rails with Type II adhesive, using high frequency method, then sanded as a unit. Meet particleboard standard ANSI A208.1, Grade 1-LD-2.

Vertical stiles shall be two piece 1 3/8" thick, with an inner stile of SCL laminated to outer 1/4" hardwood stile, matching the veneer, to provide minimum thickness after trimming of 1 3/8". Top and bottom rails shall be of structural composite lumber (SCL) construction 1 3/8" thick before prefitting. Blocking shall be provided where mortise closers or other similar devices occur.

Composite cross bands shall be applied to core prior to application of matching hardwood stiles. Exposed cross banding is not allowed along stile edges.

Veneers are to be applied to the cross banded core in a HOT PRESS using Type I exterior water resistant adhesive. Five ply construction. Exposed veneer edges are not permitted.

Openings: Factory cut openings for glass. Flush wood glass stops required for non-rated openings, species to match veneer. 20 minute rated glass kits will utilize concealed metal glass retaining clips equal or similar to VT Industries VT Fire Clip.

Glass: 1/4" tempered glass, impact resistant as required, will be furnished and installed as per Section 08800.

COMPOSITE FIRE DOORS:

Grade: WDMA I.S. 1-A, Premium, Type FD-5

Construction shall conform to Underwriter's Laboratories Class "B" 1 Hr. and 1-1/2 Hr. and Class "C" 3/4 Hr. rating requirements and shall have been tested in accordance with ASTM E 152 for fire resistance, heat transmission, and structural integrity.

Core: Core shall be calcium silicate with non-asbestos fibers, 30.8 – 34.7 lbs./ft³ nominal density, containing no asbestos. Core shall be jointed together with tongue-and-groove joints in accordance with Underwriter's Laboratories, Inc. procedure manual. Core shall be smoothly sanded prior to application of cross band and face veneer.

Edge Bands: Outer stiles are to be of same species as veneer. Inner stiles to be structural composite lumber (SCL) for 45 minute rated doors, or GP Firestop I for 60 and 90 minute rated doors which can be warranted for use with mortise butt hinges and No. 12 – 1 1/4" steel threaded-to-head screws. The door manufacturer shall drill 5/32" diameter pilot holes for all hinges.

Rails are to be structural composite lumber (SCL) for 45 minute rated doors, or GP Firestop for 60 and 90 minute rated doors, manufacturer's standard width.

Composite cross bands shall be applied to core prior to application of matching hardwood stiles. Exposed edge banding is not allowed along stile edges.

Veneers are to be applied to the cross banded core in a HOT PRESS using Type I exterior water resistant adhesive. Five ply construction. Exposed veneer edges are not permitted.

Where UBC 7-2-1997 requirements for positive pressure must be met, doors shall include all requirements as part of the door construction per "Category A" guidelines as published by ITS/Warnock Hersey. No intumescent is allowed on the frame. Only smoke gasketing applied around the perimeter of the frame to meet the "S" rating is permissible.

Vision panels and glass lights where indicated on plans, furnish and install vision panels glazed with 1/4" tempered or wire glass as indicated. Glass stops will be flush type and will utilize concealed metal glass retaining clips equal or similar to VT Industries VT Fire Clip. Where UBC 7-2-1997 requirements for positive pressure must be met, install a light kit labeled for UBC 7-2-1997 positive pressure applications to meet the appropriate fire rating.

Astragal sets, metal edges, or edge guards will not be allowed on positive pressure doors concealing intumescent within door structure.

FACTORY FINISHING:

AWI, catalyzed polyurethane, premium grade. Stain coat, three coats of sealer, two polyurethane topcoats finish per AWI Section 1500. AWI Types 2 and 3 are not acceptable.

Top and bottom rails shall be factory sealed.

HARDWARE PREPARATION:

Machining: Doors shall be factory machined for application of finish hardware that required cutting of door (except surface applied hardware) including pilot holes for hinge screws and lock fronts.

Coordination: Door manufacturer shall assume responsibility of properly coordinating hardware schedule, door schedule, and hollow metal frame shop drawings and shall supply machined doors individually identified for proper openings.

LOCATION OF HARDWARE: Refer to Section 08700.

PART 3: EXECUTION

CONDITION OF SURFACES:

Frames shall be set plumb and secure before installation of doors.

Responsibility: Contractor will be held responsible for correct door frame installation. Frames out of square, cocked at bottom or bowed in or out along vertical jambs more than 1/8" shall be reinstalled.

Temperature and Humidity: Doors shall not be installed until areas of installation have temperature and humidity near that of completed building.

DOOR INSTALLATION:

Fire door installation is required to be in accordance with the NFPA 80, "Standard for Fire Doors and Fire Windows". Machined fire doors shall be provided with detailed installation instructions when doors bear a label indicating compliance to UBC 7-2-1997 or UL 10C.

Hanging: Doors shall be fitted, hung plumb, and true to within following allowable warpage tolerances: 1/4" for doors of areas 10 sq. ft. or greater, 1/8" for doors under area of 10 sq. ft. Install fire doors in accordance with NFPA Pamphlet 80 1-11.4, 1999 edition and U.L. requirements.

Non-rated clearances: Provide clearances of 1/8" at sides and top; lock edge shall have required bevel to clear frame. Provide at bottom, for specific locations, minimum adequate clearance of finish floor coverings and/or thresholds, not to exceed 3/4". Provide other undercuts as required.

Category "A" clearances between door edge and frame must be at least 1/16" and no greater than 1/8" at the head and jambs. See NFPA 80 1-11.4, 1999 edition, for clearance under door bottoms.

Factory machined doors improperly sized for opening or improperly machined for hardware by Door Manufacturer shall be rejected and returned to factory for proper replacement.

GLAZING:

Set glass against fixed molding with specific glazing compound utilizing glass retaining clips as specified.

END OF SECTION

RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work in this section.

PART 1: GENERAL

DESCRIPTION OF WORK

The extent of each type of door and frame is shown on the drawings and schedules.

The following types of doors and frames are required:

1. FRP fiberglass/aluminum flush doors, with 2" x 4 1/2" Aluminum frames.
2. FRP panels
3. Insert frames
4. Frame capping systems
5. Door hardware

SYSTEM PERFORMANCE

Provide door assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below, as demonstrated by testing manufacturer's corresponding standard systems according to test methods designated.

Thermal Transmission (exterior doors): "U" value of not more than 0.09 (BTU/Hr. x sf x degrees F.) per AAMA 1503.01.

NFPA 80-16: Standard for fire Doors and Other Opening Protectives.

UL 10B: Standard for Fire Tests of Door Assemblies

UL 10C: Standard for Positive Pressure Fire Tests of Door Assemblies

NFPA 252: Fire Tests of Door Assemblies

Flame Spread/Smoke Developed: Provide FRP doors and panels with the following ratings in according with ASTM E 84: Flame Spread: Not greater than 170 (Class C). Smoke Developed: Not greater than 390 (Class C).

Class A option for flame spread and smoke developed rating on interior faces of exterior panels and both faces of interior panel as shown. Flame spread no greater than 15, smoke developed no greater than 310 per ASTM E-84.

Additional Criteria: Provide FRP doors and panels with the following performance: ASTM D 256 \bar{D} nominal value of 20.0 ASTM D 570 \bar{D} nominal value of .20 to .40% ASTM D 2583 \bar{D} nominal value of 50

Abrasion Resistance: Face sheet to have no greater than .029 average weight loss percentage after Taber Abrasion Test \bar{D} 25 cycles at 500 gram weight with H-18 wheel.

Stain Resistance: Face sheet to be unaffected after 24 hour exposure to SVS-1 white spray enamel. Must retain DE of .57 or less with MacBeth Colorimeter. Dark Brown (Bronze) FRP to be used as a basis.

Chemical Resistance: Face sheet to be unaffected after 4 hour exposure to acetic acid (10% solution), acetone, sodium hypochlorite (5.25% solution) and hydrochloric acid (10% solution). No discoloration or panel damage will be allowed.

QUALITY ASSURANCE

Standards: Comply with the requirements and recommendations in applicable specification and standards by AAMA, except to the extent more stringent requirements are indicated.

Performance: A minimum ten (10) year record of production of frames, doors and panels and completion of similar projects in type and size.

Instruction: The manufacturer or his representative will be available for consultation to all parties engaged in the project including instruction to installation personnel.

Field Measurement: Field verify all information prior to fabrication and furnishing of materials. Furnish and install materials omitted due to lack of verification at no additional cost to owner.

Regulation and Codes: Comply with the current edition in force at the project location of all local, state and federal codes and regulations, including the Americans with Disabilities Act of 1992.

SUBMITTALS

Product Data: Submit Manufacturers product data, specifications and instructions for each type of door and frame required in accordance with Section 01340 and the following:

1. Include details of core, stile and rail construction, trim for lites and all other components.
2. Include details of finish hardware mounting.
3. Include samples of each aluminum alloy to be used on this project. Where normal finish color and texture variations are expected, include two or more samples to show the range of such variations.
4. Include one sample of typical fabricated section, showing joints, fastenings, quality of workmanship, hardware and accessory items before fabrication of the work proceeds.

Submit shop drawings for the fabrication and installation of the doors and frames, and associated components. Details to be shown full scale. Include glazing details and finish hardware schedule.

PRODUCT DELIVERY, STORAGE AND HANDLING

Deliver materials to job site in their original, unopened packages with labels intact. Inspect materials for damage and advise manufacturer immediately of any unsatisfactory materials.

Package door assemblies in individual corrugated cartons so no portion of the door has contact with the outer shell of the container. Package and ship frames preassembled to the greatest possible extent.

PROJECT GUARANTEE

Provide a written guarantee signed by manufacturer, installer and contractor, agreeing to replace, at no cost to the owner, any doors, frames or factory hardware installation which fail in materials or workmanship, within the guarantee period. Failure of materials or workmanship includes: excessive deflection, faulty operation of entrances, deterioration of finish or construction in excess of normal weathering and defects in hardware installation. The minimum time period of guarantee is ten (10) years from acceptance.

PART 2: PRODUCTS

DOORS

Manufacturer: Subject to compliance with requirements, provide products of the following:

1. SL-17 with SpecLite3E as manufactured by Special-Lite, Inc., Decatur, Michigan.

Other acceptable manufacturers are:

1. Extrudart Products, Inc.
2. Cline Aluminum Doors, Inc.
3. Other pre-approved manufacturers.

MATERIALS AND ACCESSORIES

Aluminum Members: Alloy and temper as recommended by manufacturer for strength, corrosion resistance and application of required finish and control of color; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate with aluminum wall thickness of 0.1259.

Components: Furnish door and frame components from the same manufacturer.

Splitting of door and frame components is not permitted.

Fasteners: Aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors and other items being fastened. For exposed fasteners (if any) provide Phillips head screws with finish matching the item to be fastened.

Glazing Gaskets: For glazing factory-installed glass, and for gaskets which are factory-installed in Captive assembly of glazing stops, manufacturers standard stripping of molded neoprene, complying with ASTM D 2000 (designation 2BC415 to 3BC620), or molded PVC complying with ASTM C 509 Grade 4

Weather stripping: Manufacturer's standard pile type in replaceable rabbets for stiles; manufacturer's standard EPDM bulb type in doorframes.

Hardware:

ADA Compliant:

- a. Hardware as scheduled on drawings and specified in 08700 unless otherwise noted herein
- b. Heavy-Duty 3/8" adjustable continuous hinge: Pemko, McKinney, or Select Products.
- c. Removable mullion at pairs of doors: Von Duprin, keyed operation.

FABRICATION

Sizes and Profiles: The required sizes for door and frame units, and profile requirements are shown on the drawings.

Coordination of Fabrication: Field measure before fabrication, and show recorded measurements on final shop drawings.

Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to assembly. Remove burrs from cut edges, and ease edges and corners to a radius of approximately 1 /649.

No welding of doors or frames is acceptable.

Maintain continuity of line and accurate relation of planes and angles. Secure attachments and support at mechanical joints, with hairline fit at contacting members.

FIBERGLASS REINFORCED POLYESTER FRP FLUSH DOORS

Materials and Construction:

1. Construct 1 3 /4" thickness doors of 6063-T5 aluminum alloy stiles and rails minimum 2 5 /169 depth. Construct with mitered corners and provide joinery of 3 /89 diameter full width tie rods through extruded splines top and bottom as standard .1259 tubular shaped stiles and rails reinforced to accept hardware as specified. Provide hex type aircraft nuts for joinery without welds, glues or other methods for securing internal door extrusions. Furnish integral reglets to accept face sheet to permit a flush appearance. Rail caps or other face sheet capture methods are not acceptable.
2. Extrude top and bottom rail legs for interlocking continuous rigidity weather bar. Lock face sheet material in place with extruded interlocking edges to be flush with aluminum stiles and rails.
3. Door face sheeting: .1209 thickness fiberglass reinforced polyester. SL-17 doors with an abuse resistant engineered surface of the standard colors: to be selected from manufacturers standard selection, minimum selection as follows: white, light gray, red, blue, green, beige, dark gray, dark bronze, black.
4. Core of Door Assembly: Minimum five pounds per cubic foot density poured-in-place polyurethane free of CFC. Minimum 'R' value of 11. Ballistic rating is as indicated. Meeting stiles on pairs of doors and bottom weather bar with nylon brush weather stripping.
5. Manufacture doors with cutouts for vision lites, louvers or panels as scheduled. Factory furnish and install all glass, louvers and panels prior to shipment.
6. Pre-machine doors in accordance with templates from the specified hardware manufacturers and approved hardware schedule. Factory install hardware.

LOUVERS

Special-Lite inverted 'Y' louver, clear anodized.

FRAMING SYSTEMS

Aluminum Tubular Framing (2" x 4 1/2"):

1. Framing system from the door manufacturer of the size and type shown. .1259 minimum wall thickness and type 6063-T5 aluminum alloy. .6259 high applied doorstops with screws and weather stripping. Frame members are to be box type with four (4) enclosed sides. Open back framing will not be acceptable.

2. Caulk joints before assembling frame members. Secure joints with fasteners and provide a hairline butt joint appearance. Prefit doors to frame assembly at factory prior to shipment. Field fabrication of framing using Stick material is not acceptable.
3. Applied stops for side, transom and borrowed lites and panels, with fasteners exposed on interior or unsecure portion only. Pre-machine and reinforce frame members for hardware in accordance with manufacturer's standards and the approved hardware schedule.
4. Install with anchors appropriate for wall conditions to anchor framing to wall materials. A minimum of five anchors up to 7849 on jamb members, and one additional anchor for each foot over 7849. Secure head and sill members of transom, side lites and similar conditions.
5. Factory pre-assemble side lites to the greatest extent possible, and mark frame assemblies according to location.

Insert Framing Systems:

1. Model: SL-1031, SL-1032 or SL-1034.
2. Insert frame as shown, using an integral stop fitted with weather stripping.
3. Corner joints of miter design, secure with furnished aluminum clips, and screw into place.
4. Reinforce and pre-machine insert frame members for hardware in accordance with manufacturer's standards and the approved hardware schedule.
5. Anchors of a suitable type to fasten insert framing to existing frame materials, using a minimum of five anchors on jambs up to 7849 height, three on headers. One additional anchor for each additional lineal foot of frame.

Frame Capping:

1. Model: SL-70
2. .0939 wall thickness capping as indicated on drawings with insert frame as shown. Finish of capping to match framing.

GLAZING

Design system for Glass:

1. Manufacturers standard flush glazing system of recessed channels and captive glazing gaskets or applied stops as shown.
2. Allow for thermal expansion on exterior units.
3. Provide glass as specified in 08800 and shown, factory glazed into doors.

FINISHES

Anodized Surfaces: Clear, Class I, 0.7 mils.

PART 3: EXECUTION

INSTALLATION

Comply with manufacturers recommendations and specifications for the installation of the doors and frames. Factory install hardware, glass and louvers in doors. Factory assemble side lites and transoms to the greatest extent possible.

Set units plumb, level and true to line, without warp or rack of doors or frames. Anchor securely in place. Separate aluminum and other metal surfaces with bituminous coatings or other means as approved by architect.

Set thresholds in a bed of mastic and backseal.

Clean surfaces promptly after installation of doors and frames, exercising care to avoid damage to the protective coatings.

Ensure that the doors and frames will be without damage or deterioration (other than normal weathering) at the time of acceptance.

Provide owner with all adjustment tools and instruction sheets. Arrange an inservice session to owner at owner's convenience. Provide a minimum one-year written guarantee on all labor related to this section. Any workmanship, which is defective or deficient, shall be corrected to the owner's satisfaction and at no additional cost to the owner.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

1.01 SUMMARY

- A. Section Includes: Aluminum Swing Doors, including:
 - 1. YKK AP Series 50D Wide Stile Swing Entrances.
- B. Related Sections:
 - 1. Glass and Glazing: Refer to Division 8 Glass and Glazing Section for glass and glazing requirements.

1.02 SYSTEM PERFORMANCE DESCRIPTION

- A. Completed assemblies shall comply with all current NC Building code requirements.
- B. Performance Requirements: Provide aluminum swing doors that comply with performance requirements indicated, as demonstrated by testing manufacturers assemblies in accordance with test methods indicated.
 - 1. Air Infiltration (Single Acting Butt Hinges or Offset Pivots): Air infiltration shall be tested in accordance with ASTM E 283 at static pressure of 1.57 PSF (75 Pa). Infiltration shall not exceed the following:
 - a. Pair of Doors: 0.18 CFM/FT (1.02 m³/h·m) of crack length.
 - b. Single Doors: 0.50 CFM/FT (2.84 m³/h·m) of crack length.
 - 2. Structural: Door corner structural strength test using a dual moment loading criteria as follows:
 - a. A representative corner section consisting of a 12 inch top rail and a 24 inch long stile.
 - b. Top rail of each section is anchored to a fixed surface at 3 inches from corner joint; a load arm was subsequently mounted at 19 inches from inside edge of top rail on suspended side rail.
 - c. A load was applied to the load arm at 19 inches from inside edge of side rail and amount of rotation of load arm observed. Process was repeated at increasing loads until point of failure defined as greater than 45 degrees rotation of load arm occurred.
 - d. Test results shall be supported by an independent laboratory test report, as follows:
 - i. YKK AP Model: 50D Swing Door; 300 lbs.

3. Structural Uniform Load Test:
 - a. Single Doors: 90 psf.
 - b. Pair of Doors: 90 psf.
4. Forced Entry Resistance: 300 lbs. satisfactory.

1.03 PROJECT CONDITIONS / SITE CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication: show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.04 SUBMITTALS

- A. General: Prepare, review, approve, and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections. Product data, shop drawings, samples, and similar submittals are defined in "Conditions of the Contract."
- B. Product Data: Submit product data for each entrance series specified
- C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, and finish colors.
- D. Samples: Submit verification samples for colors. Minimum 2-1/2 inch by 3 inch (61 mm by 73 mm) samples on actual aluminum substrates indicating full color range expected in installed system.
- E. Quality Assurance / Control Submittals:
 1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Installer Qualification Data: Submit installer qualification data.
- F. Closeout Submittals:
 1. Warranty: Submit executed warranty documents specified herein, endorsed by YKK AP authorized official and installer.
 2. Project Record Documents: Submit project record documents, including operation and maintenance data for installed materials in accordance with Division 1 Project Closeout (Project Record Documents) Section.
 - a. Maintenance Data: Maintenance procedures for care and cleaning of entrance systems.

PART 2: PRODUCTS

2.01 MANUFACTURERS (Acceptable Manufacturers/Products)

- A. Entrance Door Acceptable Manufacturers:
 1. YKK AP America Inc., Austell, GA 30168, Telephone: (678) 838-6000

2. Old Castle Model Equivalent
 3. Tubelite Standard Wide Stile Entrances
- B. Aluminum Storefront Entrance Door Products:
1. Wide Stile Swing Doors: YKK AP Series 50D Wide Stile Swing Doors with 6" mid-rail.
 - a. Description: 5" Door Stile
 2. Corner Construction: Fabricate door corners joined by concealed reinforcement secured with screws, and sigma deep penetration welding.
 3. Glazing Stops: Manufacturer's standard snap-in glazing stops with EPDM glazing gaskets to prevent water infiltration.
 4. Weather stripping: Manufacturer's standard pile type in replaceable rabbets for stiles; manufacturer's standard EPDM bulb type in doorframes.
- C. Hardware: ADA Compliant:
- a. Aluminum Threshold: Pemko 2005AV, or equivalent by National Guard or Hager.
 - b. Weather stripping – perimeter wool pile: National Guard, Pemko, or Hager.
 - c. Continuous door sweep with drip – Pemko 345-V, or equivalent.
 - d. Push/Pull unless exit device indicated on Door Schedule.
 - e. Closer: LCN 4040XP, with backstop arm, with prefinished metal cover.
 - f. Heavy-Duty 4 ½" Ball-Bearing Butt Hinges: YKK, Hager, Stanley, McKinney
 - g. Removable mullion at pairs of doors: Von Duprin; keyed operation.

2.02 MATERIALS

- A. Extrusions: ASTM B 221 (ASTM B 221M), 6063-T5 Aluminum Alloy.
- B. Aluminum Sheet:
1. Anodized Finish: ASTM B 209 (ASTM B 209M), 5005-H14 Aluminum Alloy, 0.050 inch (1.27 mm) minimum thickness.
 2. Painted Finish: ASTM B 209 (ASTM B 209M), 3003-H14 Aluminum Alloy, 0.080 inch (1.95) mm) minimum thickness.

2.03 ACCESSORIES

- A. Manufacturer's Standard Accessories:
1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel exposed fasteners, countersunk, finish to match aluminum color.

2. Sealant: Non-skinning type, AAMA 803.3.
3. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer; Glazing gaskets in accordance with ASTM C 864.

2.04 RELATED MATERIALS (Specified In Other Sections)

- A. Glass: Refer to Division 8 Glass and Glazing Section for glass materials.

2.05 FABRICATION

- A. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with uniform hairline joints; rigidly secure, and sealed in accordance with manufacturer's recommendations.

1. Hardware: Drill and cut to template for hardware. Reinforce frames and door stiles to receive hardware in accordance with manufacturer's recommendations.
2. Welding: Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected.

- B. Fabrication Tolerances:

1. Material Cuts: Square to 1/32 inch (0.8 mm) off square, maximum, over largest dimension; proportionate amount of 1/32 inch (0.8 mm) on other two dimensions.
2. Maximum Offset: 1/64 inch (0.4 mm) in alignment between two consecutive members in line, end to end.
3. Maximum Offset: 1/64 inch (0.4 mm) between framing members at glazing pocket corners.
4. Joints (Between adjacent members in same assembly): Hairline and square to adjacent member.
5. Variation (In squaring diagonals for doors and fabricated assemblies): 1/16 inch (1.6 mm).
6. Flatness (For doors and fabricated assemblies): +/- 1/16 inch (1.6 mm) off neutral plane.

2.06 FINISHES AND COLORS

- A. Anodized Finish: YKK AP AMERICA Anodized Finish

1. (MATCH EXISTING) with clear protective composite coating.

- B. Finishing: Prepare aluminum surfaces for specified finish; apply shop finish in accordance with the following:

1. Anodized Coating: Electrolytic color coating followed by an organic seal applied in accordance with the requirements of AAMA 612-02. Aluminum extrusions shall be produced from quality-controlled billets meeting AA-6063-T5.

- a. Exposed surfaces shall be free of scratches and other serious blemishes.

- b. Extrusion shall be given a caustic etch followed by an anodic oxide treatment and sealed with an organic electrodeposition applied protective top coating.
 - c. The anodized coating shall comply with all the requirements of AAMA 612-02; Voluntary Specifications, Performance Requirements and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum. Testing shall demonstrate the ability of the finish to resist damage from mortar, salt spray, and chemicals commonly found on construction sites, and to resist the loss of color and gloss.
 - d. Overall coating thickness for finishes shall be a minimum of 0.7 mils.
- C. Finishes Testing:
- 1. Apply 0.5% solution NaOH, sodium hydroxide, to small area of finished sample area; leave in place for sixty minutes; lightly wipe off NaOH; Do not clean area further.
 - 2. Submit samples with test area noted on each sample.
- D. Anodized Finish Warranty: 10-year warranty commencing on Date of Substantial Completion.

PART 3: EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS / RECOMMENDATIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.
 - 1. Verify location of preset anchors, perimeter fasteners, and block-outs are in accordance with shop drawings.

3.03 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.
 - 1. Aluminum Surface Protection: Protect aluminum surfaces from contact with lime, mortar, cement, acids, and other harmful contaminants.

3.04 INSTALLATION

- A. General: Install manufacturer's system in accordance with shop drawings, and within specified tolerances.
 - 1. Protect aluminum members in contact with masonry, steel, concrete, or dissimilar materials using nylon pads or bituminous coating.
 - 2. Shim and brace aluminum system before anchoring to structure.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.06 ADJUSTING AND CLEANING

- A. Adjusting: Adjust swing doors for operation in accordance with manufacturer's recommendations.
- B. Cleaning: The General Contractor shall clean installed products in accordance with manufacturer's instructions prior to owner's acceptance, and remove construction debris from project site. Legally dispose of debris.
- C. Protection: The General Contractor shall protect the installed product's finish surfaces from damage during construction.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

1.01 SUMMARY

A. Section Includes: Aluminum Storefront Systems

1. YKK AP Series YES 45F-T MegaTherm™ Storefront System 2" x 4 ½".
2. Glass and glazing.
3. Perimeter trims.
4. Sills, extruded aluminum sub-sills, with end dams and weeps.
5. Brake Metal sill pan flashing
6. All installation hardware and accessories required for a secure installation.
7. Shims, plates and anchors required for a secure installation.
8. Perimeter sealing.

B. Related Sections:

1. Sealants: Refer to Division 7 Joint Treatment Section for sealant requirements.
2. Glass and Glazing: Refer to Division 8 Glass and Glazing Section for glass and glazing requirements.

1.02 SYSTEM DESCRIPTION

A. Completed assemblies shall comply with all current NC Building code requirements.

B. Performance Requirements: Provide aluminum storefront systems that comply with performance requirements indicated, as demonstrated by testing manufacturer's assemblies in accordance with test method indicated.

1. Wind Loads: Completed storefront system shall withstand wind pressure loads normal to wall plane indicated:
 - a. Exterior Walls:
 1. Positive Pressure:
 2. Negative Pressure:
 - b. Interior Walls (Pressure Acting in Either Direction):
2. Deflection: Maximum allowable deflection in any member when tested in accordance with ASTM E 330-84 with allowable stress in accordance with AA Specifications for Aluminum Structures.
 - a. Without Horizontals: L/175 or 3/4" (19.1mm) maximum.
 - b. With Horizontals: L/175 or L/240 + 1/4" (6.4mm) for spans greater than 13'-6" (4.1m) but less than 40'-0" (12.2m).

3. Thermal Movement: Provide for thermal movement caused by 180 degrees F. (82.2 degrees C.) surface temperature, without causing buckling stresses on glass, joint seal failure, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or detrimental effects.
4. Air Infiltration: Completed storefront systems shall have 0.00 CFM/FT² (0.00 m³/h·m²) maximum allowable infiltration when tested in accordance with ASTM E 283-84 at differential static pressure of 6.24 PSF (299 Pa).
5. Water Infiltration: No uncontrolled water on indoor face of any component when tested in accordance with ASTM E 331-86 at a static pressure of 15 PSF (718 Pa).
6. Watertight Installations: Field Tested in accordance with AAMA 501.2-03.
7. Thermal Performance: When tested in accordance with AAMA 1503.1-88 Condensation Resistance Factor (CRF), and ASTM C 236-89 Thermal Transmittance (U Value) as follows:
 - a. CRF: A minimum of 59.
 - b. U Value: 0.58 BTU/HR/FT²/°F or less.

1.03 SUBMITTALS

- A. General: Prepare, review, approve, and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections. Product data, shop drawings, samples, and similar submittals are defined in "Conditions of the Contract."
- B. Product Data: Submit product data for each type storefront series specified.
- C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors and textures.
- D. Samples: Submit verification samples for colors on actual aluminum substrates indicating full color range expected in installed system.
 1. Typical framing member
 2. Extruded aluminum subsill with weeps and end dams
 3. Bent plate sill pan
- E. Quality Assurance / Control Submittals:
 1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Installer Qualification Data: Submit installer qualification data.
- F. Closeout Submittals:
 1. Warranty: Submit warranty documents specified herein.
 2. Project Record Documents: Submit project record documents for installed materials in accordance with Division 1 Project Closeout (Project Record Documents) Section.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project. If requested by Owner, submit reference list of completed projects.
 - 2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.
- B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.
- C. Mock-Ups (Field Constructed): Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color, and workmanship standard.
- D. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legal dispose of mock-up when no longer required.
- E. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.
- F. Field Test: Conduct field test to determine water-tightness of storefront system. Conduct test in accordance with AAMA 501.2-03 at locations selected by Architect.

1.05 PROJECT CONDITIONS / SITE CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.06 WARRANTY

- A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.
 - 1. Beneficiary: Issue warranty in the legal name of the project Owner.
 - 2. Warranty Period: 5 years commencing on Date of Substantial Completion
 - 3. Warranty Acceptance: Owner is sole authority who will determine acceptability of manufacturer's warranty documents.
 - 4. Anodized Finish Warranty: 10-year warranty commencing on Date of Substantial Completion.

PART: 2 PRODUCTS

2.01 MANUFACTURERS (Acceptable Manufacturers/Products)

A. Acceptable Manufacturers:

YKK AP America Inc., Austell, GA 30168, Telephone: (678) 838-6000

1. Storefront System: YKK AP YES 45F-T MegaTherm™ Storefront System.

Oldcastle FG-3000T
US Aluminum Series IT 451

B. Storefront Framing System:

1. Description: Center set, exterior flush glazed; jambs and vertical mullions continuous; head, sill, intermediate horizontal attached by screw spline joinery.
2. Components: Manufacturer's standard extruded aluminum mullions, 0-15 degree hinged mullions, 90 degree corner posts, flexible corner posts, three-way corner posts, entrance door framing, and indicated shapes.
3. Thermal Barrier: Provide continuous thermal barrier by means of 6/6 nylon polyamide glass fiber reinforced pressure extruded bars. Systems employing non-structural thermal barriers are not acceptable.
4. Provide extruded aluminum sub-sill with weeps and integrally formed end dams at exterior storefront systems. Profiles, sizes and shape as indicated on Drawings.
5. Doorstops to be integral fin type, snap-in type not acceptable.
6. Provide internal frame reinforcements all closer locations.

2.02 MATERIALS

A. Extrusions: ASTM B 221 (ASTM B 221M), 6063-T5 Aluminum Alloy.

B. Aluminum Sheet:

1. Anodized Finish: ASTM B 209 (ASTM B 209M), 5005-H14 Aluminum Alloy, 0.050 inch (1.27 mm) minimum thickness.
2. Painted Finish: ASTM B 209 (ASTM B 209M), 3003-H14 Aluminum Alloy, 0.080 inch (1.95 mm) minimum thickness.

2.03 ACCESSORIES

A. Manufacturer's Standard Accessories:

1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel exposed fasteners, countersunk, finish to match aluminum color.
2. Sealant: Non-skinning type, AAMA 803.3

3. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer; Glazing gaskets in accordance with ASTM C 864.
4. Brake metal plate sill pan flashing with hemmed edges.
5. Aluminum flat plates as needed for anchoring; shims, plates and anchors required for a secure installation.

2.04 RELATED MATERIALS (Specified In Other Sections)

- A. Glass: Refer to Division 8 Glass and Glazing Section for glass materials.
- B. Metal Window Panels: Refer to Division 8 Glass and Glazing Section for metal panel materials.

2.05 FABRICATION

- A. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with hairline joints; rigidly secure, and sealed in accordance with manufacturer's recommendations.
- B. Fabrication Tolerance:
 1. Material Cuts: Square to 1/32 inch (0.8 mm) off square, over largest dimension; proportionate amount of 1/32 inch (0.8 mm) on the two dimensions.
 2. Maximum Offset: 1/64 inch (0.4 mm) in alignment between two consecutive members in line, end to end.
 3. Maximum Offset: 1/64 inch (0.4 mm) between framing members at glazing pocket corners.
 4. Joints (Between adjacent members in same assembly): Hairline and square to adjacent member.
 5. Variation (In squaring diagonals for doors and fabricated assemblies): 1/16 inch (1.6 mm).
 6. Flatness (For doors and fabricated assemblies): +/- 1/16 inch (1.8 mm) off neutral plane.

2.06 FINISHES AND COLORS

- A. Anodized Finish: YKK AP AMERICA Anodized Finish
 1. Anodized (MATCH EXISTING), with protective composite coating.
- B. Finishing: Prepare aluminum surfaces for specified finish; apply finish in accordance with the following:
 1. Anodized Coating: Electrolytic color coating followed by an organic top coating applied to aluminum extrusions produced from quality-controlled billets meeting AA-6063-T5.
 - a. Exposed surfaces shall be free of scratches and other serious blemishes.

- b. Extrusion shall be given a caustic etch followed by an anodic oxide treatment and sealed with an organic electrodeposition applied protective top coating.
- c. Overall coating thickness for finishes shall be a minimum of 0.7 mils.
- d. Coating shall conform to Aluminum Association Standard AAM12C22A4X. A4X designation shall signify an anodic coating of 0.4 mils minimum followed by an organic top coating of a minimum 0.3 mils.
- e. In addition to the Aluminum Association Standard above, finish shall conform to the following:
 - i. AAMA 605.2 Mortar Resistance Test Specification; Test Method per ASTM C207, 24 Hour Pat Test.
 - ii. CASS Corrosion Resistance Test. CASS 240/ASTM B368 Test Method.
 - iii. Other AAMA 605.2 Performance Tests specified in these specifications, such as: 7.3 Dry Film; 7.8.2 Salt Spray Resistance; 7.9.1.2 Color Retention, South Florida; 7.9.1.4 Gloss Retention, South Florida.

C. Finishes Testing:

- 1. Apply 0.5% solution NaOH, sodium hydroxide, to small area of finished sample area; leave in place for sixty minutes; lightly wipe off NaOH; Do not clean area further.
- 2. Submit samples with test area noted on each sample.

D. Anodized Finish Warranty: 10-year warranty commencing on Date of Substantial Completion.

PART 3: EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS / RECOMMENDATIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

3.03 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

3.04 INSTALLATION

- A. General: Install manufacturer's system in accordance with shop drawings, and within specified tolerances.

1. Protect aluminum members in contact with masonry, steel, concrete, or dissimilar materials using nylon pads or bituminous coating.
2. Shim and brace aluminum system before anchoring to structure.
3. Provide brake metal sill pan flashings with hemmed edges at exterior storefront systems. Provide profiles, sizes and profiles as indicated on Drawings. Extend sill pan flashings continuous with spliced joints; set in continuous beds of waterproofing sealant.
4. Verify storefront system allows water entering system to be collected in gutters and weeped to exterior. Verify weep holes are open, and metal joints are sealed in accordance with manufacturer's installation instructions.
5. Seal metal-to-metal storefront system joints using sealant recommended by system manufacturer.
6. All installation hardware and accessories required for a secure installation into rough openings, including shims, plates and anchors as necessary.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.
- B. Field Test: Conduct field test to determine water-tightness of curtain wall system. Conduct test in accordance with AAMA 501.2-03 at locations selected by Architect.
- C. Perform minimum of three tests on various areas as determined by the Architect's representative. Perform test in Architect's presence. Field test first panels completed, then test all panels thereafter upon completion of all fixed panels. Generate and issue test report in compliance with AAMA 501.2-03 requirements.

3.06 ADJUSTING AND CLEANING

- A. Adjusting: Adjust operating items as recommended by manufacturer.
- B. Cleaning: The General Contractor shall clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance, and remove construction debris from project site. Legally dispose of debris.
- C. Protection: The General Contractor shall protect installed product's finish surfaces from damage during construction.

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, and all Division 1 Specifications that apply to the work specified in this Section.

PART 1: GENERAL

1.01 SUMMARY

- A. Section Includes: Steel Sliding Fire Window Assembly
- B. Related Sections:
 - 1. Sealants: Refer to Division 7 Joint Treatment Section for sealant requirements.
 - 2. Glass and Glazing: Refer to Division 8 Glass and Glazing Section for glass and glazing requirements.

1.02 SUBMITTALS

- A. General: Prepare, review, approve, and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections. Product data, shop drawings, samples, and similar submittals are defined in "Conditions of the Contract."
- B. Product Data: Submit product data for each type specified.
- C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors and textures.
- D. Samples: Submit verification samples for colors on actual aluminum substrates indicating full color range expected in installed system.
 - 1. Typical framing member
 - 2. Glass sample
- E. Closeout Submittals:
 - 1. Warranty: Submit warranty documents specified herein.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project. If requested by Owner, submit reference list of completed projects.
 - 2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.

1.04 PROJECT CONDITIONS / SITE CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.05 WARRANTY

- A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.

PART: 2 PRODUCTS

2.01 MANUFACTURERS (Acceptable Manufacturers/Products)

- A. Acceptable Manufacturers:

Steel Sliding Fire Windows, ¾ Hour rated, as manufactured by Nissen & Company

Equal products by C.R. Laurence Co., Inc.

Equal products by QuikServ

- B. Description and Features:

1. Two panel design, one fixed panel and one sliding panel.
2. 4" wide steel frame, nail-on or masonry type, with full bottom sill track.
3. Spring activated automatic closures:

Fire resistant rating of 45 minutes in wall construction of masonry, wood, or steel studs per report number 2781, as tested under fire tests of window assemblies, ASTM 163-65 and National Fire Protection Association 257-70.

Windows to be manufactured with an automatic closing device. A spring actuated closer which operates with a 160 degree fusible link mounted on the interior side of the frame.

4. Hardware: Sliding panels shall be furnished with a positive latching 1/8" thick steel latch, which is attached to the bottom rail. Which engages on a 1/4" thick keeper that is surface mounted to the sill member. A spring actuated automatic closing device IS used in conjunction with a 160 degree fusible link assembly mounted on the unit. This assembly functions as a self-closing latch. Provide with keyed lock.
5. Stainless steel integral counter, 2" x 10" x 18 gauge
6. Weatherstripping: Sliding sash panel shall be fully weatherstripped with silicone treated wool pile or equivalent and vinyl.
7. All steel and sash members shall be furnished with a factory applied primer paint coat on all surfaces, conforming to Underwriters Laboratory specifications, ready for field painting per 09900.

8. Glazing: Windows to be factory glazed with clear ¼" thick tempered wire glass or 3/16" clear firelite. Lites to have minimum of 24 gauge wire with maximum opening of one square inch per Underwriters Laboratory. Provide muntins as required for individual lites of glass not to exceed 720 square inches each. Glass to comply with ANSI Z97.1 and ASTM C1036.
9. Removable header for maintenance access.
10. Heavy-duty anti-lift ball bearing top hung carrier.
11. Burglar security bar

2.02 MATERIALS

- A. Frame and sash members shall be fabricated of 16 gauge cold rolled steel, formed and assembled with 12 gauge gussets and 16 gauges angles. Material complies with ASTM A366.

2.03 ACCESSORIES

- A. Manufacturer's Standard Accessories:
 1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel exposed fasteners, countersunk, finish to match aluminum color.
 2. Sealant: Non-skinning type, AAMA 803.3, fire-rated where required. Reference 07900.
 3. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer; Glazing gaskets in accordance with ASTM C 864.

PART 3: EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS / RECOMMENDATIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

3.03 PREPARATION

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

3.04 INSTALLATION

- A. General: Install manufacturer's system in accordance with shop drawings, and within specified tolerances.
 - 1. Protect aluminum members in contact with masonry, steel, concrete, or dissimilar materials using nylon pads or bituminous coating.
 - 2. Shim and brace aluminum system before anchoring to structure.
 - 3. All installation hardware and accessories required for a secure installation into rough openings, including shims, plates and anchors as necessary.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.06 ADJUSTING AND CLEANING

- A. Adjusting: Adjust operating items as recommended by manufacturer.
- B. Cleaning: The General Contractor shall clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance, and remove construction debris from project site. Legally dispose of debris.
- C. Protection: The General Contractor shall protect installed product's finish surfaces from damage during construction.

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, apply to the work specified in this Section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Work of this Section shall include all labor, materials, equipment, transportation, tools and storage required for complete installation of all finish hardware shown and scheduled on Drawings and specified herein. Intent of this Specification is to provide complete finishing hardware requirements for entire building project excepting hardware, which is specifically mentioned hereinafter as being furnished by others. Any openings not specifically mentioned herein shall be furnished consistent with hardware specified for similar openings.

Wood doors for Project are prefit. Coordinate with wood door manufacturer in furnishing hardware templates and schedules at earliest possible time.

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this section refer to Section 01068.

QUALITY ASSURANCE:

Manufacturers: Hardware listed in Hardware Schedule shall be supplied by one of following Manufacturers listed for each item or an equal. To establish quality of hardware required, catalog numbers of Manufacturers listed in Hardware Schedule have been used. Hardware furnished shall be of equal type, design, quality and function as that specified in Hardware Schedule.

Acceptable Manufacturers: Similar items manufactured or furnished by other manufacturers may be submitted for approval, subject to these Specification requirements and written approval received 7 days prior to bid date.

Supplier's Qualifications: Contractor shall select only supplier who has in his employ qualified personnel, who shall manage and coordinate complete hardware contract, and shall also be available to visit Project in order to solve or correct conditions affecting proper hardware installation or adjustment, as required.

SUBMITTALS:

Schedule: Submit Hardware Schedule to Architect in six (6) copies, as promptly as possible, showing quantities, types, catalog numbers and locations of various items of finish hardware required. Submit as specified for shop drawings in accordance with GENERAL CONDITIONS.

Job Completion Instructions: At completion of work turn over to Owner all tools, instructions, and maintenance information for his use in maintaining hardware. Furnish Owner also with two copies of Job Use Finish Hardware Schedule for his permanent records.

PRODUCT HANDLING:

Packing, Marking and Labeling: Deliver hardware to project site in manufacturer's original packages. Each article of hardware shall be neatly wrapped and individually packed in substantial carton or other container, properly marked or labeled to be readily identifiable with Hardware Schedule.

Storage: General Contractor shall furnish secure storage area for delivery by Hardware Supplier of finish hardware and storage of same. General Contractor shall be responsible for shortages due to theft and pilferage.

General Contractor shall provide in storage area adequate counters, shelves, and bins for assembly and grouping of hardware for distribution and installation.

PART 2: PRODUCTS

TYPES, SIZES AND DESCRIPTIONS:

Hardware shall be of types and sizes listed in this Section, applied with fastenings of proper size, quantity and finish.

Templates: Hardware for application on metal shall be made to standard templates. Furnish physical samples or templates, as required to Manufacturer of metal doors and frames for proper manufacturer and application.

Reinforcement: Reinforcing for hardware shall be furnished and installed by Door and Frame Manufacturer.

Modifications to hardware required by reasons of construction characteristics shall be such as to provide same operative or functional features.

Provide hardware for fire rated openings in compliance with UL, UL 10C-1998, UBC 7-2-1997, NFPA-80 and CFR Part 36 (ADA) guidelines. Provide only hardware, which has been tested and listed by UL for types and sizes of doors scheduled. All hardware shall conform to ADA requirements. These requirements take precedence over any other requirements or specifications of this section.

Category "A" Positive Pressure Installations:

Hardware located above 40" AFF to be listed and labeled in accordance with UBC 7-2-1997 and UL 10C-1998 for use in positive pressure fire rated wood doors.

In order to meet smoke requirements, a smoke seal, listed and labeled for UBC 7-2-1997 Parts 1 and 2 positive pressure installations, must be mounted around the perimeter of the doorframe.

Flat bar type astragals only will be allowed on pairs of doors with fire ratings up to 60 minutes with concealed intumescent inside the door structure.

Door Smoke Seals: Doors in smoke partitions shall meet the requirements for a smoke and draft control assembly tested in accordance with UL 1784 for Smoke, and installed in accordance to NFPA 105-2010 Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives.

Provide strikes with extended lips as necessary.

Provide strike boxes, complete with dust box inserts, and no exposed screws.

Provide doors to loading platforms, boiler and mechanical rooms, stages or platforms, utility stairs, and electrical closets with knurling on inside of lever.

Locksets: Stanley Best 9K Series Heavy-Duty Cylindrical Locks, to receive Best interchangeable cores. All cylinders Best 7-pin, interchangeable core and keyed into an existing factory registered Grand Master Key System with a restricted keyway. Provide 15K Lever and rose.

Provide construction cores and keys during the construction period. Construction, control and operating keys and cores shall not be part of the Owner's permanent keying system or furnished on the same keyway as the Owner's permanent keying system. Permanent cores and keys prepared according to the accepted keying schedule will be furnished to the Owner by the local Best Access Systems office prior to occupancy. The contractor or his hardware installer will install permanent cores and return the construction cores to the Best Access Systems office.

Provide CODE required tactile warning surfaces (knurling) for all door operating hardware for doors leading to mechanical, boiler, electrical, or chemical storage areas.

KEYING REQUIREMENTS

Keying: All locks and cylinders to be construction master keyed, and grand master keyed to the existing Best great grand master key system. Provide 4 keys per cylinder, stamped with keying symbol. All cylinders standard type. Provide original Best pins and Best nickel silver key blanks.

Representative from the key company is required to meet with Owner's representative prior to turning cylinders and to turn all cylinders, and set up key cabinet.

Hardware supplier shall meet with the Architect and Owner to receive keying instructions before preparing schedule for approval.

One Manufacturer: Following items within each classification shall be furnished totally by one manufacturer.

Hinges	Locksets
Exit devices	Closers

Door Stops: All doors shall be provided with wall stops or overhead stops, to suit condition. For example, doors opening onto millwork or open space shall receive overhead stops. Solid wood blocking to be installed at all gypsum wallboard wall stop locations. Provide floor stops at doors with magnetic hold open devices.

Fire rated openings: All fire rated openings, except classrooms, shall receive closers and ball bearing hinges, whether scheduled or not.

Coordinators: All door pairs with closers to be provided with coordinator devices as necessary for proper sequential closing operation.

Hinges: Unless otherwise noted, 3 hinges shall be provided each interior door to 36" width and 86" height. 4 HD hinges shall be provided for interior doors exceeding 36" width or 86" height. Provide fire-rated hinges on all fire rated doors. Exterior hinges shall be heavy-duty with non-removable pins. Hinges for doors with closers shall be ball bearing.

Exterior hinges shall be heavy-duty continuous hinge specified for aluminum and FRP doors.

Materials and Finishes (Match Existing 100/200 Buildings Dark Bronze Hardware): (All products except closers, thresholds, weatherstripping to have brass or bronze base metal unless otherwise noted).

	<u>Materials</u>	<u>Finishes</u>
Hinges, Outswing Exterior Doors	Dark Bronze	US 20
Hinges, Inswing Exterior Doors	Dark Bronze	US 20
Hinges, Interior Doors	Dark Bronze	US 20
Pivots	Dark Bronze	US 20
Exit Devices	Dark Bronze	US 20

**DIVISION 8
SECTION 08700**

**DOORS AND WINDOWS
FINISH HARDWARE – INCLUDING SECURITY**

Mortise Lock Trim	Dark Bronze	US 20
Cylindrical Lock Trim	Dark Bronze	US 20
Dead Lock Trim	Dark Bronze	US 20
O.H. Holders & Stops	Dark Bronze	US 20
Door Stop and Holders	Dark Bronze	US 20
Box Strikes	Wrought	Prime
Thresholds	Aluminum	Dark Bronze Anodized
Thresholders	Steel	US 20
Weatherstrip	Aluminum	Dark Bronze Anodized
Flatgoods	Brass	US 20
Fasteners:		

Materials and Finishes (300/400/500/600 Buildings): (All products except closers, thresholds, weatherstripping to have brass or bronze base metal unless otherwise noted).

	<u>Materials</u>	<u>Finishes</u>
Hinges, Outswing Exterior Doors	Stainless	US 32 D
Hinges, Inswing Exterior Doors	Steel	US 26 D
Hinges, Interior Doors	Steel	US 26 D
Pivots	Satin Chrome Plate	US 26 D
Exit Devices	Satin Chrome Plate	US 26 D
Mortise Lock Trim	Satin Chrome Plate	US 26 D
Cylindrical Lock Trim	Satin Chrome Plate	US 26 D
Dead Lock Trim	Satin Chrome Plate	US 26 D
O.H. Holders & Stops	Satin Chrome Plate	US 26 D
Door Stop and Holders	Satin Chrome Plate	US 26 D
Box Strikes	Wrought	Prime
Thresholds	Aluminum	Clear Aluminum
Thresholders	Steel	Galvanized Steel
Weatherstrip	Aluminum	Aluminum
Flatgoods	Stainless	US 32 D
Fasteners:		

Use concealed fasteners whenever possible. Install door closers with (4) through bolted oval head screws.

Hardware to be installed on metal work shall be furnished with machine screws. For exposed fasteners on interior in bronze or brass, use matching color and material for fasteners. For all other exposed fasteners on interior, use stainless steel except where noted specifically otherwise. Furnish stainless steel screws for all exterior work.

Install fixed locking screw in strike plate for exterior locksets after final adjustments made during 6-Month Service and Adjustment Inspection.

HARDWARE ITEMS:

All Products shall be by one of the following manufacturers - no exceptions:

- a. Butt Hinges: Hager, Stanley, McKinney
- b. Exterior Heavy-Duty Continuous Gear Hinges, for all aluminum and FRP exterior doors: Select Products SL14HD, or equal by Markar Roton, Hager or Pemko.

- c. Surface Closers: LCN 4011 / 4111, Ryobi D-4551 Series, Precision 2000 Series. Provide metal covers with set screw anchors, in matching finish.
- d. LOCKSETS:
 - a. Locksets: Best 9K Cylindrical Locks with 15K Lever and rose; ANSI A156.2, Series 4000, Grade 1 UL listed, extra heavy-duty cylindrical type.
 - b. Locksets for doors scheduled for Classroom Function and similar spaces:
 - 1. Security Lockset: Intruder (IN) F11 function, with double keying and interior indicator rose for Classroom function, Best 9-K, 7 barrel system
- e. All Key Cores: Best 9-K, 7 pin interchangeable core, restricted keyway
- f. Exits Devices: Von Duprin 99 Series, each with a cylinder for trims and a cylinder for dogging.
- g. Wherever doors are equipped with exit devices, view windows shall have concealed / flush glass beads and shim filler kit for mounting across view glass.
- h. Electronic Access Control Components - EAC
 - a. Exit Devices at Electronic Access Control doors (Furnished and installed by the General Contractor's Division 8 Subcontractor): Von Duprin QEL 98/99 Series, with electric ETW hinges for hinge edge power transfer for interior doors. Provide EPT-2 for exterior doors continuous hinges.
 - b. Card / Proximity Reader Unit: HID IClass Reader, Model S2 900PTNNEK00460-S2SEC, Mini-Mullion Version or equivalent by Helios. Provide all necessary mounting bases/brackets/boxes, wiring, junction boxes, solenoids, power supplies, and all required accessories for a complete assembly. Coordinate with building Electronic Access Control System.
 - c. Intercom Camera Buzz-In Unit: Intercom Buzzer Unit with video camera, weather-resistant with aluminum or stainless-steel housing and cover plate. Aiphone IX Series or equivalent by Helios or HID. For remote operation of an electric door strike or QEL from an access control base station operator using visual monitoring wide angle HD camera and two way voice 10W loudspeaker. Provide accessories: tamper switch, security relay. Provide all necessary mounting bases/brackets/boxes, wiring, junction boxes, solenoids, power supplies, and all required accessories for a complete assembly. (Remote operation shall be from an access control base station location, indicated on Drawings, and located by the Owner). Coordinate with building Electronic Access Control System.
 - d. Electric Strike: 2N Helios IP Force Electric Strike Model 932071E, 11211 12V/230 mA DC. Coordinate with building Electronic Access Control System.
- i. Pneumatic Automatic Door Openers: LCN; coordinate with building Electronic Access Control System.
- j. Removable Mullions: Von Duprin, Yale, Detex, keyed type.
- k. Overhead Holders/Stops: Corbin, Rockwood Manufacturing, Glynn-Johnson.
- l. Thresholds: National Guard, Pemko, Hager.
- m. Push/Pulls: Rockwood Manufacturing, Ives, Hager.

- n. Stops: Glynn-Johnson, Rockwood Manufacturing, Ives, Hager.
- o. Flush Bolts: Glynn-Johnson, Rockwood Manufacturing, Ives, Hager.
- p. Silencers: Glynn-Johnson, Rockwood Manufacturing, Ives.
- q. Kick Plates: Rockwood Manufacturing, Ives, Hager.
- r. Automatic Flush Bolts: Glynn-Johnson, Rockwood Manufacturing.
- s. Coordinator: Glynn-Johnson, Rockwood Manufacturing, Trimco
- t. Weather strip & Rain Drips: National Guard, Pemko, Hager.
- u. Smoke Perimeter Door Frame Gaskets: Pemko, Hager, Reese
- v. Smoke Door Bottom Sweep: Pemko, Hager, Reese
- w. Door Bottoms: National Guard, Pemko, Hager.
- x. Magnetic Door Holders: LCN SEM 7800 Series.

Other items shall be as scheduled.

Provide the following hardware material as scheduled in the door schedule:

Hinges with closer	BB 1279 4 ½ x 4 ½
St/Stl hinges with closer	BB 1191 4 ½ x 4 ½
HD hinges with closer	BB 1168 4 ½ x 4 ½
St/Stl HD hinges w closer	BB 1199 4 ½ x 4 ½
Hinges without closer	1279 4 ½ x 4 ½
St/Stl hinges without closer	1191 4 ½ x 4 ½
HD continuous hinges	SL24HD all exterior doors
Classroom set	Best 9K, Intruder (IN) F11 function
Other sets	Best 9K, Entrance (AB) F109, Privacy (L) F76, Passage (N) F75, Office (B) F82, Storeroom (D) F86.
Exit device	99 L all interior locations (F as req'd), 99 NL x DT all exterior doors. CD cylinder dogging.
EAC Exit Device	Von Duprin 98/99 Series QEL with EPT. CD cylinder dogging.
Mullion	4954 (9954 as req'd), keyed type.
Electric Strike:	2N IP Force 932000 Series
Cylinder	Standard 7-pin
Closer	4010 / 4011, with 3049 hold-open arm at all exterior doors, metal cover
Closer with backstop	4010 / 4011 – 3077CNS, metal cover with set screws
Kick plate	1935 8 x 2 LDW
Wall stop	232 W
Floor stop	241 F
Overhead stop	9-331
Flush bolts	282 D, with astragal and top and bottom plungers
Threshold	Pemko 2005AV
Upper rain drip	Reese R201C
Lower rain drip/sweep	Pemko 345_V
Frame Smoke gasketing	Pemko 332CR
Door Bottom Smoke Sweep	Pemko 307AV

Perimeter gasketing	Pemko 296_R
HD Interlock gasketing	Pemko 336
Push plate	70C 4 x 16
Pull handle	107 x 70C 4 x 16
Key cabinet	Lund Equipment, Telkee Model 1205, provide cabinet with 350 capacity, with 25% expansion capability.

ELECTRONIC ACCESS CONTROL SYSTEM / ENTRY HARDWARE DEVICES

1. WHERE INDICATED ON DRAWINGS, PROVIDE ACCESS CONTROL SYSTEM DEVICES AND COMPONENTS, DOOR HARDWARE AND ACCESSORIES, FULLY COMPATIBLE WITH AN S2 SECURITY ACCESS CONTROL SYSTEM AND SOFTWARE PROGRAM, INCLUDING BUT NOT LIMITED TO THE FOLLOWING COMPONENTS. ALL HARDWARE / EQUIPMENT SPECS SHALL COMPLY WITH JOHNSTON COUNTY SCHOOL STANDARDS.
 - a. CARD / PROXIMITY READER UNIT: HID ICLASS CARD READER, MODEL S2-900PTNNEK00460-S2SEC, MINI-MULLION VERSION WHERE REQUIRED. PROVIDED BY THE DIVISION 17 ACCESS CONTROL CONTRACTOR.
 - b. ACCESS CONTROL SYSTEM FIELD PANEL: S2 NETWORK NODE, S2-NN-E2R-WM, HOUSING UP TO SEVEN (7) S2 APPLICATION BLADES, SUPPORTING UP TO 14 DOORS, WITH NETWORK DROP - PROVIDED BY THE DIVISION 17 ACCESS CONTROL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE ELECTRICAL POWER.
 - c. ACCESS CONTROL BASE STATION: COMPUTER SOFTWARE PROGRAM, INSTALLED ON OWNER'S PC, FOR SOFTWARE CONTROL OF CONNECTED DOORS - PROVIDED BY THE DIVISION 17 ACCESS CONTROL CONTRACTOR.
 - d. SURFACE MOUNTED ELECTRIC STRIKE: HES 9600 SERIES - PROVIDED AND INSTALLED BY DIVISION 8 DOOR HARDWARE SUPPLIER. VERIFY IF NEEDED.
 - e. ELECTRIFIED MORTISE LOCKSET: SCHLAGE L909x SERIES - PROVIDED AND INSTALLED BY DIVISION 8 DOOR HARDWARE SUPPLIER.
 - f. NOT USED
 - g. DOOR CONTACTS FOR NEW DOOR/FRAMES: RECESSED DOOR SWITCH SETS, (1) FOR EACH DOOR LEAF, GRI 180 SERIES, 195-12WG, BY GEORGE RISK INDUSTRIES. DOUBLE POLE, DOUBLE THROW, WIDE GAP. PROVIDED BY THE DIVISION 17 ACCESS CONTROL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE RACEWAY TO DOOR FRAME, FOR EACH DOOR LEAF.
 - h. DOOR CONTACTS FOR EXISTING DOOR/FRAMES: SURFACE MOUNT SWITCH SETS, (1) FOR EACH DOOR LEAF, GRI 4460 SERIES, 4463A, MINIATURE ALUMINUM, BY GEORGE RISK INDUSTRIES - PROVIDED BY THE DIVISION 17 ACCESS CONTROL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE RACEWAY TO DOOR FRAME, FOR EACH DOOR LEAF.
 - i. ARMORED DOOR CORDS: ENFORCER SD-969-S18Q SURFACE MOUNTED CORD WITH DIE-CAST ALUMINUM END CAPS, BY SECO-LARM U.S.A - PROVIDED BY THE DIVISION 17 ACCESS CONTROL CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE RACEWAY TO HINGE SIDE OF DOOR, AT 36" AFF. DOORS WITH EPT WILL NOT REQUIRE ARMORED DOOR CORDS.
 - j. POWER SUPPLIES, FOR ALL POWERED DOOR LOCKING HARDWARE / EXIT DEVICES. PROVIDED AND INSTALLED BY DIVISION 8 DOOR HARDWARE SUPPLIER.

- k. VON DUPRIN QUIET ELECTRIC LATCH RETRACTION – QEL EXIT DEVICE 98/99 SERIES. PROVIDED AND INSTALLED BY DIVISION 8 DOOR HARDWARE SUPPLIER.
 - l. EPT ELECTRIC POWER TRANSFER (frame to door wiring path): VON DUPRIN MODELS EPT 2, EPT 10, EPT10C (As Application Requires), FOR USE WITH VON DUPRIN QEL EXIT DEVICES. PROVIDED AND INSTALLED BY DIVISION 8 DOOR HARDWARE SUPPLIER.
 - m. ELECTRONIC CONVERSION KITS, FOR EXISTING NON-POWERED DOOR EXIT DEVICES. PROVIDED AND INSTALLED BY DIVISION 8 DOOR HARDWARE SUPPLIER. KIT SHALL BE COMPATIBLE WITH EXISTING EXIT DEVICES.
2. NEW OR REPLACEMENT INTERCOM / VIDEO CAMERA UNIT (DOOR CALL STATION UNIT):
- WHERE INDICATED, PROVIDE A COMPLETE VIDEO INTERCOM BUZZ-IN ACCESS SYSTEM ASSEMBLY, AIPHONE IX SERIES OR EQUIVALENT, INCLUDING BUT NOT LIMITED TO THE FOLLOWING COMPONENTS.
- 1)DOOR STATION: INTERCOM BUZZER UNIT WITH VIDEO CAMERA, WITH ALUMINUM OR STAINLESS STEEL COVER PLATE. AIPHONE IX SERIES OR EQUIVALENT. WEATHER RESISTANT COVER PLATE FOR EXTERIOR STATION.
 - 2)MASTER STATION: MASTER VIDEO STATION WITH PICTURE MEMORY, DOOR STRIKE RELEASE TOGGLE OR SWITCH, TABLE TOP MOUNTED AT RECEPTION DESK. AIPHONE IX SERIES OR EQUIVALENT.
 - 3)POWER SUPPLY: PS-1820UL POWER SUPPLY
3. CONTROLLED ACCESS SYSTEM DEVICES PROPOSED SHALL BE COMPLETE ASSEMBLIES, WITH ALL NECESSARY COMPONENTS; TO INCLUDE BUT NOT LIMITED TO POWER SUPPLIES, CABLES AND CABLING, ELECTRICAL POWER CIRCUITS RAN IN REQUIRED VOLTAGES, RACEWAYS, BOXES, TRANSFORMERS, CONTACTORS, RELAYS, SOLENOIDS, ELECTRIC DOOR STRIKES, ETC. COORDINATE ALL SUBCONTRACTORS AND TRADES FOR PROVIDING COMPLETE ASSEMBLIES.

Pneumatic Automatic Door Openers: (Coordinate model and operation sequences with wireless access control system and devices, including wireless intercom/buzz-in/camera device provided by the access control system provider)

Provide automatic, single leaf door opener, complete operational assembly, at main front entrance, and at locations indicated on Drawings. Motor and controller capacity to be sized for a single door operator, and shall meet all accessibility codes manual force requirements of 5 lbs. Full closing force shall be provided when the power or assist cycle ends.

All power operated systems shall include compatibility with key pads or card readers and have built-in supply for actuators and peripherals, power actuators, remote actuators, and be compatible with electric latch retraction, or electric strikes or magnetic locks, and intercom/camera buzz-ins devices.

All units shall be covered by a 2-year warranty.

All units shall be inspected by the factory representative for proper installation and function after installation.

Interior and Exterior Wall Plate Actuators: Actuators shall be hardwired low voltage and shall have a stainless steel 4 ½" round plate with engraved blue filled accessibility symbol. At all locations the actuator box shall built into the wall construction flush, providing a box made of industrial grade components, and providing weather resistant installation at exterior locations. When required, exterior actuator will be deactivated with adjacent key switch. LCN 956, LCN 958.

Automatic Door Opener: (hardwired)	LCN	4822 Reg, Auto-Equalizer, Pneumatic Operator
	LCN	4822-18G Drop Down Plate
	LCN	4822-3077L Long Arm (if required)
	Frame Manuf.	Set of Integral Seals
	LCN	Interior and Exterior 8310-856 Wired Actuator Pads
	LCN	868F and 868S Mounting Boxes (to suit condition)
	LCN	7982ES Controller
	LCN	925 1/8" ID Tubing
	Locknetics	(2) 653-1414-L2 Key Switch with (2) LED Lights
	Various	(2) Cylinders For (2) Key Switches
	SCE	Remote Release Actuator 701RD-AA
	Various	Wire Supplies, Conduits, Boxes and Misc. Materials for Complete Assembly
	Post/Pedestal	6" x 6" field painted galvanized steel pipe post, with concrete post footing

PART 3 - EXECUTION

GENERAL:

Consult project drawings and details and otherwise become familiarized with work so that all items furnished will conform to openings to which applied.

Coordinate hardware with other allied trades such as carpentry, millwork, metal frames, etc.

Prepare and submit to Architect for approval as promptly as possible three (3) copies of completed detailed schedule.

Immediately after award of hardware contract, request approved shop drawings from such trades with which hardware must be coordinated.

After checking approved shop drawings, supply promptly such template information, template drawings, approved hardware schedule, etc., as may be required to facilitate progress on job.

PRE-INSTALLATION CONFERENCE AND TRAINING:

Prior to installation of any hardware, conduct pre-installation conference with Architect representative, Owner representative, hardware distributor representative, and installation crew members to verify installation and adjustment techniques and directions. Installation personnel shall be currently certified by Allegion for LCN door closer and Von Duprin exit device installation and adjustment. Allegion will provide and conduct mandatory training courses for installers.

APPLICATION:

Apply hardware in accordance with approved Shop Drawings, with fastenings of proper size, quantity, and finish, and in accordance with Manufacturer's instructions coordinate.

Operation: All items of hardware shall fit and operate properly.

HARDWARE LOCATIONS:

Door Pulls: 42" from finished floor to center of grip.

Push-Pull Bar: 42" from finished floor to center of bar of center between bars and combination.

Top Hinge: To frame Manufacturer's standard, but not greater than 10" from head of frame to centerline of hinge.

Bottom Hinge: To frame Manufacturer's standard but not greater than 12-1/2" from finished floor to centerline of hinge.

Intermediate Hinges: Equally spaced between top and bottom hinge.

Locks and Latches: 38" from finished floor to center of knob.

Deadlocks (with separate latch-set and/or pull): 48" from finished floor to centerline of strike.

Locate pivots in accordance with Pivot Manufacturer's requirements.

FINAL INSPECTION: After installation of all finish hardware is completed, and before building is accepted, General Contractor shall have capable representative of hardware manufacturers, minimum of an AHC, visit building to inspect and approve installation; to make all necessary adjustments; and to carefully instruct Owner in proper use, servicing, adjusting and maintaining of hardware.

SIX MONTH SERVICE AND REPORT: Six months after acceptance of each area of the project, readjust each item of hardware and restore to proper function. Install fixed locking screw in strike plate for exterior locksets after final adjustments made during 6-Month Service and Adjustment Inspection, and include confirmation statement in the written report. Conduct walk through with Owner regarding recommended additions or modifications to maintenance procedures. Clean and lubricate as required. Replace items, which have deteriorated or failed due to faulty design, materials, or installation. Provide Architect with written report upon completion of above, with list of attendees.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

SUMMARY:

Provide glass and glazing and special fire glass as indicated below, complete.

Work Included This Section:

Glass and Glazing For:

- Aluminum Entrances
- Steel and Wood Doors
- View Windows and Panels
- Curtain Walls
- Exterior Windows
- Fire-Rated Sliding Windows
- Special fire glass, frames and doors

Related Sections include:

088853 Security Glazing

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this Section refer to Section 01068.

QUALITY ASSURANCE:

Provide safety glass (tempered, laminated, impact resistant) as required by the IBC Code, and complying with requirements of ANSI Z97.1 - American National Standard for Glazing Materials Used in Buildings -- Safety Performance Specifications and Method of Test.

Label each piece of glass designating type and thickness of glass. Do not remove label prior to installation.

Permanently identify each unit of tempered glass. Etch or ceramic fire identification on glass; identification shall be visible when unit is glazed.

Warranty: Provide manufacturer's standard 10 year warranty, including include replacement of sealed glass units exhibiting seal failure or leakage, interpane dusting or misting.

Manufacturers:

Standard: For purposes of designating type and quality for work under this Section, Drawings and Specifications are based on products manufactured or furnished by following manufacturers:

- American St. Gobain Corporation
- Libby-Owens-Ford Glass Company
- Mississippi Glass Company
- Pittsburg Plate Glass Company
- Technical Glass Products
- Nippon Electric Glass Co., Ltd.
- Pilkington
- Armoured One

SUBMITTALS:

Glass and Glazing: Submit samples of each type of glass, glazing compound, sealant and tapes for Architect's approval.

Product Data: Submit copy of manufacturer's specifications and installation instructions for each type of glass and glazing material. Include test data or certification substantiating that glass complies with specified requirements and manufacturer's warranties.

Submit manufacturer's standard 10 year warranty for insulated glass units.

MANUFACTURER'S LABELS:

Labels showing Glass Manufacturer's identity, type of glass, thickness and quality will be required on each piece of glass. Labels must remain on glass until it has been set and inspected.

Containers: All glazing compounds shall arrive at project site in unopened, labeled containers.

PRODUCT HANDLING:

Sizes of glass indicated on Drawings are approximately only. Determine actual size required by measuring frames to receive glass at project site, or from guaranteed dimensions provided by Frame Supplier.

Cutting: All glass shall be cleancut. Nipping to remove flares or to reduce oversized dimensions of any type of glass will not be permitted.

Deliver glass to site in suitable containers that will protect glass from weather and from breakage. Store material in safe place to minimize breakage, but deliver sufficient glass to allow for normal breakage.

DESIGN AND PERFORMANCE REQUIREMENTS:

Watertight and airtight installation of each piece of glass is required. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating doors) without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials, and other defects in work.

PART 2: PRODUCTS

GLASS:

Low-E Insulating Glass: Unless otherwise noted, 1" thick panels; 1/4" thick float glass to exterior, 1/4" clear Low-E glass to interior; Low-E shall be on the 3rd surface, with 1/2" space between glass panes by dessicant filled spacer and sealant device. Coordinate with application of specified Security Film, 08870 Security Glazing Films.

Exterior Aluminum and Fiberglass Entrance Doors: Provide 5/16" security glazing, reference specification 088853 Security Glazing.

Interior Aluminum Doors: Provide 5/16" security glazing, reference specification 088853 Security Glazing.

Provide safety glass throughout as required by the IBC Code, and ANSI Z97.1 - American National Standard for Glazing Materials Used in Buildings -- Safety Performance Specifications and Method of Test.

SETTING BLOCKS AND SPACER SHIMS:

Fabricate blocks and shims from neoprene. Shape to required size and thickness. Material used for blocks and spacers must be compatible with type of compounds and sealants used and shall not cause staining or discoloration of sealant or frame.

Shore A durometer hardness of setting block and shim material shall be 70 to 90 points for setting blocks and 50 points for spacer shims, or as recommended by compound or sealant manufacturer.

GLAZING MATERIALS:

Sealant and Compound shall be Vulkem 116 by Master Mechanics Company, Maccolastic Acrylic Compound by Macco Division, Glidden Company, Betaseal 850 by Essex Chemical Company or approved equal.

Glazing Tape shall be butyl rubber sealant type partly vulcanized, self-adhesive, non-staining, elastomeric butyl rubber tape, complying with AAMA 800.

Bestaseal 650 Tape by Essex Chemical Company
Duraribbon 1070 by PPG Industries
176 Strucsureglaze by Protective Treatments Company

Compatibility: Where combination of sealing materials is required for glazing in same frame, manufacturer shall certify that all glazing materials furnished are compatible with each other and compatible with material used for setting blocks and spacer shims.

PART 3: EXECUTION

CONDITION OF SURFACES:

Preparation: Check all frames prior to glazing. Openings shall be square, plumb, and with uniform face and edge clearances. Maintain 1/8" minimum bed clearance between glass and frame on both sides.

Clean all surfaces to be glazed with xylol, a 50-50 mixture of acetone and xylol, or other solvents recommended by compound or sealant Manufacturer. Any defects affecting satisfactory installation of glass shall be corrected before starting of glazing.

Temperature: Do not apply any compound or sealant at temperatures lower than 40 degrees F.

INSTALLATION:

Workmanship: Apply glazing compound uniformly with accurately formed corners and bevels. Remove excess compound from glass and frame. Use only recommended thinners, cleaners and solvents. Do not cut or dilute glazing compound without approval from Architect. Make good contact with glass and frame when glazing and facing off.

Cleaning: Compound shall be removed from glass before it hardens. Remove any excess sealants from glass and adjoining surfaces during working time of material, within two to three hours.

Blocks and Spacers: Where setting blocks and spacer shims are required to be set into glazing compound or sealant, they may be butted with compound or sealant, placed in position, and allowed to set firmly prior to installation of glass.

Miscellaneous Interior Glazing: Unless otherwise indicated, all interior glass shall be channel glazed with glazing compound. Apply as follows:

Apply ample back compound to rabbet so that it will ooze out when glass is pressed into position and completely cover glass in rabbet. Press glass into position.

Secure glass in place by application of stop beads. Bed stop beads against glass and bottom of rabbet with compound, leaving proper thickness between glass and stop beads. Secure stop beads in place with suitable fastenings. Strip surplus compound from both sides of glass and tool at slight angle to provide clean sight lines.

Glazing Aluminum Entrances and Window Wall System:

Glass shall be set in accordance with aluminum entrances and window walls Manufacturer's shop drawings and instructions.

Install moldings level, plumb and square. Moldings at corners shall be accurately cut, neatly fitted, and joined as recommended by Storefront manufacturer.

REPLACEMENTS AND CLEANING:

Condition: At completion of work, all glass shall be free from cracks, sealant smears and other defects.

Protection/Replacement: Protect glass surfaces and edges during the construction period. Keep glass free from contamination by materials capable of staining glass. Any glass that is defective before acceptance, or within one year warranty period, as result of manufacturing, transporting, or performance of Contractor, shall be removed and replaced with new glass without cost to Owner.

END OF SECTION

PART 1- GENERAL

RELATED DOCUMENTS

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

SUMMARY

1. Shooter/Attack Resistant Security Glazing
2. Shooter/Attack Resistant Fire Rated Security Glazing

CODES AND REFERENCES:

- A. WEY-SA – Standard for shooter/attack certification and Forced Entry
- B. GSA Level C – General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.
- C. ASTM F1642 – Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings
- D. UL972 – Standard for Burglary Resistant Glazing
- E. EN356 P4 – Testing Classification of Resistance Against Manual Attack
- F. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- G. 16 CFR 1201 – Safety Standard for Architectural Glazing Materials; Consumer Products Commission; current edition.
- H. ANSI Z97.1 – American National Standard for Safety Glazing Materials Used in Building, Safety Performance Specifications and Methods of Test; 2010.
- I. NFPA 80 – Fire Doors and Windows.
- J. ICC/BC – International Building Code.
- K. NFPA 252 Standard Methods of Fire Tests of Door Assemblies.
 1. Tested in accordance with Underwriters Laboratory Standard for Positive Pressure Fire Tests of Door Assemblies UL9, UL10B and UL10C.
- L. State Building Codes, Local Amendments.

QUALITY ASSURANCE

- A. Manufacturers Qualifications: Provide glazing systems produced by a manufacturer with not less than 5-years successful experience in the fabrication of assemblies of the type and quality required.
- B. Installer's Qualifications: Glazed systems shall be installed by a firm that has not less than 5-years successful experience in the installation of systems like those required.
- C. Source Limitations for Glass: Obtain all glass products from a single manufacturer.
- D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified independent agency.

SUBMITTALS

- A. Submit under provisions of Division 1
- B. Product Data: Manufacturers data sheets of each product to be used, including:
 1. Preparation instructions and recommendation
 2. Storage and handling requirements and recommendations
 3. Installation methods.
- C. Glazing Schedule:
 1. Use same designations indicated on Drawings.
 2. Listing types and thicknesses for each size, opening and location.
 3. Samples:
 - a) Submit one 12" x 12" sample of each glass type specified
 - b) Submit one sample of each glazing sealant and/or glazing tape for color review.

4. Warranty: Warranty documents specified herein.
- D. Certifications:
1. Certification that all sealants are fully compatible with the surfaces and finishes with which they are in applied.
 2. Certification that all products comply with the test methods listed under Paragraph 1.3 Codes and References.

DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's unopened and undamaged packaging, with manufacturer's labels intact.
- B. Protect glass and glazing materials from damage in ordinance with manufacturer's recommendations.

WARRANTIES

- A. Non-Rated Glass Units: Warrant for 10 years from date of Delivery to be free from delamination and failure of seals and not to develop material obstruction of vision, as a result of dust, moisture or film formation on internal glass surfaces.
- B. Low-E Glass: Warrant for 10 years from date of Delivery to be free of peeling or other deterioration of the Low-E coating.
- C. Fire Rated Glass: Warrant for 5 years from date of Delivery to be free from delamination and discoloration.
- D. Glazing Sealants: Warrant for 10 years per sealant manufacturer's standard warranty of merchantable quality. Warranty shall certify that cured sealants:
 1. Will perform as a watertight weather-seal.
 2. Will not become brittle or crack due to weathering or normal expansion and contraction of adjacent surfaces.
 3. Will not harden beyond a Shore A durometer of 50, nor soften below a durometer of 10.
 4. Will not change color when used with compatible back-up materials.
 5. Will not bleed.

PART 2- PRODUCTS

MANUFACTURER'S

- A. Acceptable Manufacturer: Armoured One, LLC., 386 North Midler Ave. Syracuse, NY 13206. Tel: 315-720-4186; Email:info@armouredone.com; Web: www.armouredone.com.
- B. Requests for substitutions will be considered in accordance with provisions in Division 1.

MATERIALS

- A. Shooter/Attack Resistant Security Glass, Non-Rated: AOTSG516
 1. Thickness: 5/16"
 2. WEY-SA-C2 – Standard for shooter/attack certification and forced entry Class 2.
 3. GSA Level C – General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.
 4. ASTM F1642 – Standard Test Method for Glazing and Glazing Systems Subject to Air blast Loadings.
 5. UL972 – Standard for Burglary Resisting Glazing.
 6. EN356 P4 – Testing and Classification of Resistance against manual attack.
 7. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 8. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Consumer Products Safety Commission; current edition.
 9. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.

B. Shooter/Attack Resistant Security Glass, 20-Minute Rated: AOTSG516FR-20

1. Thickness: 5/16"
2. Tested in accordance with NFPA 80, NFPA 252, UL 9, UL 10B, UL 10C
3. WEY-SA-C2 – Standard for shooter/attack certification and forced entry Class 2.
4. GSA Level C – General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.
5. ASTM F1642 – Standard Test Method for Glazing and Glazing Systems Subject to Air blast Loadings.
6. UL972 – Standard for Burglary Resisting Glazing.
7. EN356 P4 – Testing and Classification of Resistance against manual attack.
8. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
9. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Consumer Products Safety Commission; current edition.
10. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.

C. GLAZING MATERIAL

1. General: Provide standard color of glazing materials as selected by Architect. Comply with manufacturer's recommendations for applications and conditions at time of installation.
2. 3M VHB 5952 – 3M (Anchoring tape applied on vision kits to adhere glazing to vision kit.)
3. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
4. Setting Blocks: Neoprene, silicone or EPDM, 70-90 durometer hardness, with proven compatibility with glazing materials used.
5. Spacers: Neoprene, silicone or EPDM, 40-50 durometer hardness with proven compatibility with glazing materials used.
6. Compressible Fillers: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

I. FABRICATION

1. Cut glass to full fit and play, consistent with glass and glazing material manufacturers' recommendations and the requirements of the Drawings and References, Codes and Standards Article.
2. Follow code requirements and glass manufacturer's recommendations for minimum bite and edge and face clearances.
3. Cut lights to smooth straight edges, clean, free of nicks and flares; nipping not permitted. Follow glass manufacturer's directions exactly for tinted and Low-E glass
4. Glass Identification:
 - a) Glazing in fire rated doors and fire rated windows shall bear UL classification marking in accordance with UL 9.
 - b) Manufacturer's and UL identifications for glazing shall be permanently etched to be visible after glass has been set in place and glazed.

PART 3 -EXECUTION

GENERAL

- A. Each glazing installation must withstand normal temperature changes, and impact loading without failure of glass, failure of sealants or gaskets, deterioration of glazing materials and other defects in the work.
- B. Protect glass from damage during handling and installation, and subsequent operation of glazed components of the work. Discard units with edge damage or other imperfections.

- C. Glazing channel dimensions are intended to provide for necessary bite on glass, minimum edge clearance, and adequate tape or sealant thicknesses, with reasonable tolerances.
- D. Comply with recommendations by manufacturers of glass and glazing products, except where more stringent requirements are indicated, including those of referenced glazing standards.

PREPARATION

- A. Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrate.
- B. Where sealants are used, apply primer or sealant to joint surfaces where recommended by sealant manufacturer.

INSTALLATION

- A. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.
- B. Where sealants are used at butt joints, apply sealant in thin continuous clear bead. Tool sealant to a uniform, continuous, even profile.
- C. Apply glazing stops and clean up any excess structural sealants from finished surfaces.
- D. Conform to recommendations of glass manufacturer where such covers points not shown on Drawings or specified herein.
- E. Remove "loose" stops furnished with the units and reinstall as a part of the glazing operation.
- F. Handle glass so as to prevent nicks and flares on glass edges.
- G. Install glass exceeding 1/8" thickness on identical setting blocks permanently mounted and centered at 1/4 points. If necessary to reduce deflection of horizontal supporting member, blocks may be placed at 1/8 points or with the nearest end 6" (whichever is greater) from edge of glass unit. Ensure that blocks are equidistant from centerline of glass. Do not obstruct weep holes.
- H. Provide permanently mounted edge blocks at head and jambs of dry-glazed lights to prevent damage to glass edges during installation and lateral shifting of glass due to thermal and seismic loads and vibrations. Follow recommendations of Flat Glass Marketing Assn. Glazing Manual.
- I. Set glass to maintain bite, edge and face clearance stipulated by code and the glass manufacturer.
- J. Take special precautions to protect laminated glass edges from deterioration of vinyl interlayer by moisture.
- K. Glaze dry-glazed aluminum doors and frames as per manufacturer's directions using glazing gaskets and seals furnished with the units.
- L. Miter gaskets at corners and install so as to prevent pulling away at corners. Gaskets with gaps or other visible irregularities on door and window units shall be corrected by manufacturer or fabricator at no additional cost to University.

PROTECTION AND CLEANING

- A. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- B. Wash and polish glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish Date of Substantial Completion in each area of project. Comply with glass manufacturer's recommendations for final cleaning.

END OF SECTION 088853

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1 - GENERAL

SUMMARY / SCOPE

Security Glazing film applied to designated glazing assemblies. This specification is for an optically clear glass shatter resistant and abrasion resistant window film which, when applied to the interior window surface, will help hold broken glass together and reduce the ultra-violet light that normally would enter through the window. This is an easily applied, tear-resistant safety and security window film for providing an increased measure of protection in a broad range of uses including basic glass fragment retention, spontaneous glass breakage, seismic preparedness, safety glazing, protection from windborne debris, bomb blast mitigation, and deterring Smash and Grab or Break and Entry events. Certain applications may require the film be used in conjunction with a film attachment system. The film shall be 14 mil 3M Safety S140 Safety and Security Window Film.

CODES AND REFERENCES:

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

The 1985 American Society for Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Handbook of Fundamentals. The American National Standards Institute (ANSI).

ANSI Z97.1 Specification for Safety Glazing Material used in Buildings

The American Society for Testing and Materials (ASTM):

1. ASTM E-308 Standard Recommended Practice for Spectrophotometry and Description of Color in CIE 1931 System
2. ASTM E-903 Standard Methods of Test for Solar Absorbance, Reflectance and Transmittance of Materials Using Integrating Spheres
3. ASTM D-882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D-1044 Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test)
5. ASTM D-2582 Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting
6. ASTM D-4830 Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing.
7. ASTM G-90 Standard Practice for Performing Accelerated Outdoor Weatherizing for Non-metallic Materials Using Concentrated Natural Sunlight
8. ASTM G 26 Standard Practice for Performing Accelerated Outdoor Weatherizing for Non-metallic Materials Using Concentrated Natural Sunlight
9. ASTM E-84 Standard Method of Test for Surface Burning Characteristics of Building Materials
10. ASTM D-1004 Standard Method of Test for Resistance of Transparent Plastics to Tearing (Graves Tear Test)
11. ASTM E-1886 Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
12. ASTM E-1996 Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
13. ASTM F-1642 Standard Method of Test for Glazing and Glazing Systems Subject to Airblast Loadings, as adapted by the U.S. Government GSA Test Standard Protocols
14. ASTM F-2912 Standard Specification for Glazing and Glazing Systems Subjected to Airblast Loadings

The Consumer Products Safety Commission (CPSC) 16 CFR, Part 1201, Safety Standard for Architectural

Glazing Material

GSA-TS01-2003 General Services Administration Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings

QUALITY ASSURANCE

- A. Manufacturer Qualifications: Glazing film manufacturer specializing in manufacture of security glazing films with minimum 10 years successful experience.

SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Test Reports: Detailed reports of full-scale chamber tests to specified criteria, using assemblies identical to those required for this project.
- C. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Record of product certification for safety requirements.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
- D. Samples: For each film product to be used, minimum size 4 inches by 6 inches, representing actual product, color, and patterns.
- E. Specimen warranty.

DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufactures unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent—based materials, in accordance with requirements of authorities having jurisdiction.

FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

WARRANTY

- A. Provide 15-Year manufacturer's replacement warranty to cover film against delaminating, peeling, cracking, discoloration, and deterioration.
- B. Provide 5-Year manufacturer's replacement warranty to cover glass failure due to thermal shock fracture of the glass unit.

PART 2 - PRODUCTS

MANUFACTURER'S

- A. The film shall be 3M Safety S140 Safety and Security Window Film, as manufactured by 3M Commercial Solutions Division.
- B. Substitutions: Not Permitted.

MATERIALS

A. Security Glazing Film:

1. Transparent polyester film for permanent bonding to glass. The film material shall consist of an optically clear polyester film, consisting of co-extruded micro-layers, with a durable acrylic abrasion resistant coating over one surface, and a UV stabilized pressure sensitive adhesive on the other. The film color is clear and will not contain dyed polyester. The film shall have a nominal thickness of 14 mils (0.014 inches). There shall be no evidence of coating voids.

B. Film Properties (nominal):

- a) Tensile Strength (ASTM D882): 25,000 psi
- b) Break Strength (ASTM D882): 25,000 psi
- c) Percent Elongation at Break (ASTM D882): >125%
- d) Percent Elongation at Yield (ASTM D882): greater than 100%

C. Solar Performance Properties: film applied to ¼" thick clear glass

- a. Visible Light Transmission (ASTM E 903): 85%
- b. Visible Reflection: not more than 10%
- c. Ultraviolet Transmission: less than 1% (300 – 380 nm)
- d. Solar Heat Gain Coefficient: 0.78

D. Flammability: The Manufacturer shall provide independent test data showing that the window film shall meet the requirements of a Class A Interior Finish for Building Materials for both Flame Spread Index and Smoked Development Values per ASTM E-84.

- a. Flame Spread Index (FDI): 5
- b. Smoke Developed Index (SDI): 25

E. Abrasion Resistance: The Manufacturer shall provide independent test data showing that the film shall have a surface coating that is resistant to abrasion such that, less than 5% increase of transmitted light haze will result in accordance with ASTM D-1044 using 50 cycles, 500 grams weight, and the CS10F Calibrase Wheel.

F. Adhesion to Glass: The Manufacturer shall provide independent test data showing that the film shall have a 90-degree peel strength (adhesion to glass) according to ASTM D-1044 of at least 6 lbs/in.

G. Adhesive System: The film shall be supplied with a high mass pressure sensitive weatherable acrylate adhesive applied uniformly over the surface opposite the abrasion resistant coated surface. The adhesive shall be essentially optically flat and shall meet the following criteria:

- a. Viewing the film from a distance of ten feet at angles up to 45 degrees from either side of the glass, the film itself shall not appear distorted.
- b. It shall not be necessary to seal around the edges of the applied film system with a lacquer or other substance in order to prevent moisture or free water from penetrating under the film system.

H. Impact Resistance for Safety Glazing: The Manufacturer shall provide independent test data showing that the film, when applied to either side of the window glass, shall meet the 400 ft-lb impact requirements of 16 CFR 1201 (Category 2) and ANSI Z97.1 (Class A, Unlimited). Testing shall be done with film applied both on 1/8" and ¼" annealed glass.

I. Provide supplemental anchoring system as required to meet forced entry resistance requirements. Anchoring System: DOW 995 or GE SCS2000 SilPruf Structural Sealant with high impact styrene trim.

J. Impact Protection: per ASTM E1886 / E1996

PART 3 - EXECUTION

EXAMINATION

- A. Field -Applied Film: Verify that existing conditions are adequate for proper application and performance of film.
- B. Examine glass and frames, insure that existing conditions are adequate for proper application and Performance of film.
- C. Verify glass is not cracked, chipped, broken, or damaged.
- D. Verify that frames are securely anchored and free of defects.

PREPARATION

- A. Clean glass of dust, dirt, paint, oil, grease, mildew, mold, and other contaminants that would inhibit adhesion.
- B. Immediately prior to applying film, thoroughly wash glass with neutral cleaning solution.
- C. Protect adjacent surfaces.
- D. Do not begin installation until substrates have been properly prepared.

INSTALLATION

- A. Install in accordance with manufacturer's instructions, without air bubbles, wrinkles, streaks, bands, thin spots, pinholes, or gaps, as required to achieve specified performance.
- B. Accurately cut film with straight edges to required sizes allowing 1/16-inch to 1/8-inch gap at perimeter of glazed panel unless otherwise required by anchorage method.
- C. Seams. Seam film only as required to accommodate material sizes; seam without overlaps.
- D. Clean glass prior to film installation with neutral cleaning solution.
- E. Peel back release liner and apply film to glass. Using squeegees, push out solution between film and glass.
- F. Once film is installed, anchor the edges of the film by applying approved structural sealant and high impact styrene to the edges of the frames and film.
- G. Clean glass and excess structural sealants from finished surfaces
- H. Remove any labels or protective covers.

FILM VERIFICATION

- A. Awarded contractor will be required to verify that film installed meets the requirements highlighted in this bid. By submitting a bid, you as the contractor understand that three pieces of glass, chosen at random will be removed and film applied will be measured to verify that film installed meets specifications as requested. Film may need to be removed as part of the verification process.

PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Provide acoustical ceiling systems, complete as shown and as specified herein, including exposed tee suspension systems and acoustical lay-in boards.

Coordinate work with installation of air conditioning grilles and diffusers specified in Division 15B and with installation of lighting fixtures specified in Division 16.

INDUSTRY STANDARDS:

For listing of names of industry standard agencies mentioned by abbreviation in this section refer to Section 01068.

QUALITY ASSURANCE:

Manufacturers:

Standard: For purposes of designating type and quality for work in this Section, Drawings and Specifications are based on products by following manufacturers:

Ceiling Suspension Systems shall be by one of following, or equivalent by:

- Eastern Products Corp.
- Chicago Metallic Corp.
- Donn Products, Incorporated

Acoustical Tiles shall be Armstrong or equivalent products by:

- BPB
- Chicago Metallic Corp
- USG

Source: Products for use on this Project shall be of one Manufacturer for each function.

Shop Drawings: Indicate following:

Layout of inserts required for ceiling suspension system.

Reflected ceiling layouts for all areas to receive acoustical ceilings. Details of all connections to work of other trades.

Submit typical layout showing size and spacing of exposed grid and hangers as related to structural frame.

Samples: Submit samples of each acoustical unit, suspension system, and accessories.

Test Reports: Submit (in triplicate) copies of certificate of Flame Spread Class 25 rating under requirements of SS-S-118A, required for all acoustical units on Project.

Manufacturer's Data: Submit (in triplicate) Manufacturer's printed installation instructions for suspension system.

Warranty: Provide 15 year "humidity no-sag" manufacturer's warranty for tiles and grid system, warranted to replace tiles and damaged or defective system components at no cost to owner if tiles sag visibly within the warranty period. Warranty terms equivalent to Armstrong Humiguard Plus 15 year warranty.

PRODUCT HANDLING:

Delivery: Deliver acoustical ceiling boards to Project site in Manufacturer's original packages, with seals unbroken, with Manufacturer's name and contents legibly marked thereon and with testing laboratory labels where required.

Storage: Store ceiling tiles and boards in enclosed areas, with same temperature and humidity conditions as areas in which material is to be installed.

ENVIRONMENTAL CONDITIONS:

Building Conditions: Install acoustical materials only when normal temperature and humidity conditions approximate interior conditions that will exist when building is occupied. Building shall not be cold and damp, or hot and dry.

Glazing shall be in place and all exterior openings closed. All concrete, plastering and other wet work shall be complete and dry.

Provide heat and ventilation to maintain proper conditions before, during, and after acoustical work is performed.

PART 2: PRODUCTS

TYPES AND SYSTEMS: All acoustical materials shall be of types indicated by type numbers on Drawings, as follows:

Type 1: 24" x 24" x 5/8" Armstrong fine fissured Humiguard Plus, RH90 No. 1728 / Prelude XL Grid

Type 2: 24" x 24" x 5/8" Armstrong fine fissured tegular edge Humiguard Plus, RH90 No. 1732 / Prelude XL Grid

Type 3: 24" x 24" x 5/8" Vinyl faced gypsum panels, with white stipple finish / AL Prelude Plus Grid

Type 4: 5/8" Moisture resistant gypsum board on hat channels/cold-rolled channels framing system.

Type 5: 5/8" Firecode gypsum board on hat channels/cold-rolled channels framing system. Smoke resistant construction.

Type 6: 5/8" Gypsum board on hat channels/cold-rolled channels framing system.

HANGERS:

Wire: No. 12 gauge galvanized steel.

SUSPENSION SYSTEM:

Components: System shall consist of main support tees, cross tees, splice clips, wall angles, and hold down clips.

Design Loads: Suspension system shall be designed to support respective lay-in units and light fixtures with deflection of suspension members not to exceed 1/360 of span of member.

Exposed Grid System: Armstrong Exposed Grid System (hot dipped galvanized steel), consisting of main tees and cross tees with 15/16" exposed flange. Wall molding shall be cold-rolled galvanized steel, channel shaped, with 1" exposed face of same finish as exposed tee surfaces.

Provide all aluminum grid at AL grid locations indicated.

Provide bullnosed preformed corners for bullnosed wall corners.

Finish: Exposed surfaces of tees and of wall moldings shall be flat white, baked polyester.

PART 3: EXECUTION

INSTALLATION OF ACOUSTICAL CEILING SYSTEMS:

General Requirements:

Suspension System: Install strictly according to approved Shop Drawings layouts for spaces and manufacturer's printed instructions.

Ceiling Tile Pattern, Layout, and Type:

1. Install acoustical ceiling in patterns and types indicated on approved shop drawings and, as described in this specification.
2. Unless indicated otherwise herein or on Drawings, ceilings shall be laid out symmetrically in each space, with no less than half size panels or tiles at walls.

Installation of acoustical materials and suspension systems shall be made by experienced mechanics in strict accordance with Manufacturer's written instructions.

Fit parts neatly and accurately, true to line and plane.

Where hangers fall at structural members, install hanger clips in strict accordance with written instructions of Manufacturer of hanger clips.

Suspension system, including wall mold, shall be level to within 1/8" in 12 feet, with ceiling panels in place.

Exposed grid members shall be straight and in alignment. All exposed surfaces shall be flush and level.

General Requirements for Acoustical Ceilings:

Scribe lay-in units neatly to abutting surfaces and to penetrations or protrusions.

Exercise care to prevent soiling of ceiling tiles during installation. Leave entire system neatly and accurately fitted.

CLEANING: Following installation, clean all soiled and discolored surfaces. Remove and replace units, which are damaged or improperly installed.

EXTRA STOCK: Furnish Owner 5% of each pattern of acoustical tile installed in Project for maintenance replacements.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

DESCRIPTION OF WORK:

Extent of painting work is shown on drawings and schedules, and as herein specified.

The work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.

Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

"PAINT" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

Paint all exposed surfaces, unless otherwise noted, whether or not colors are designated in "schedules", except where natural finish of material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas. If color or finish is not designated, Architect will select these from standard light colors available for materials systems specified. Where indicated, "accent" colors are medium to deep shades, which shall require no more than one additional paint coat.

Following categories of work are not included as part of field-applied finish work, or are included in other sections of these specifications.

Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated components such as architectural woodwork, wood casework, and shop-fabricated or factory-built mechanical and electrical equipment or accessories.

Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) metal toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, finished mechanical and electrical equipment including light fixture, switchgear and distribution cabinets, elevator entrance frames, doors and equipment.

Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

SUBMITTALS:

Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.

Samples: Submit samples for Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

On 12"x12" hardboard, provide sample of each color and material, with texture to simulate actual conditions. On CMU face shell, provide sample of each color and material, with texture to simulate actual

conditions Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved.

Wall Mockup: Paint 10'x10' section of wall with permanent lighting illumination for Architect's review and approval, prior to ordering paint materials.

Epoxy Paint Product Data: Epoxy paint manufacturer shall provide documentation that the epoxy product is tested and approved for application in such locations and for application on the surface material that is being used, and use is in compliance 2012 NC Building Code Sections 1210.2 and 1210.3; and in compliance with 2012 Plumbing code Sections 419.3 and 417.4.1 for providing smooth, hard non-absorbent surfaces adjacent to urinals and water closets and shower heads.

DELIVERY AND STORAGE:

Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

- Name or title of material
- Fed. Spec. number, if applicable
- Manufacturer's stock number and date of manufacturer
- Manufacturer's name
- Contents by volume, for major pigment and vehicle constituents
- Thinning instructions
- Application instructions
- Color name and number

JOB CONDITIONS:

Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C), unless otherwise permitted by paint manufacturer's printed instructions.

Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F (7 degrees C) and 95 degrees F (35 degrees C), unless otherwise permitted by paint manufacturer's printed instructions.

Do not apply paint in snow, rain, fog or mist; or when relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.

Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

PART 2: PRODUCTS

COLORS AND FINISHES:

Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates.

Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

Provide undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

EXTERIOR PAINT SYSTEMS:

A. METAL - (Galvanized)

1. Acrylic Systems

a. Gloss Finish

- i. Surface Preparation: Refer to Part 3 Surface Preparations of these specifications for Cleaning & Testing/Evaluations; Manufacturer's guidelines and recommendations stand as requirements of this work.
- ii. 1st Coat: S-W Pro-Cryl Universal Primer, B66-310 Series (10 mils wet, 4.0 mils dry film thickness)
- iii. 2nd Coat: S-W Sher-Cryl HPA High Performance Acrylic, B66-300 Series (10 mils wet, 4 mils dry film thickness)
- iv. 3rd Coat: S-W Sher-Cryl HPA High Performance Acrylic, B66-300 Series (10 mils wet, 4 mils dry film thickness)

B. METAL - (Misc. Iron, Ornamental Iron, Catwalks, Fire Escapes, Hydrants, Handrails, Ladders, Fences)

1. ACRYLIC Systems

a. Gloss Finish

- i. Surface Preparation: Manufacturer's guidelines and recommendations stand as requirements of this work
- ii. 1st Coat: S-W Pro-Cryl Universal Primer, B66-310 Series (10 mils wet, 4.0 mils dry film thickness)
- iii. 2nd Coat: S-W Pro Industrial Multi-Surface Acrylic, B66-500 Series
- iv. 3rd Coat: S-W Pro Industrial Multi-Surface Acrylic, B66-500 Series (4 mils wet, 2 mils dry per coat)

C. METAL - (Shop Primed Metal Doors and Frames/ Panels, etc.)

1. Acrylic Systems

- a. Gloss Finish
 - i. Surface Preparation: Manufacturer's guidelines and recommendations stand as requirements of this work
 - ii. 1st Coat: S-W Pro Industrial Multi-Surface Acrylic, B66-500 Series
 - iii. 2nd Coat: S-W Pro Industrial Multi-Surface Acrylic, B66-500 Series (4 mils wet, 2 mils dry per coat)

INTERIOR PAINT SYSTEMS

A. MASONRY - (Walls & Ceilings, Poured Concrete, Precast Concrete, Unglazed Brick, Cement Board)

1. Acrylic Enamel Systems

- a. Semi-Gloss Finish
 - i. 1st Coat: Block filler, (tinted and rolled in to fill all pits and pores completely, as required).
 - ii. 2nd Coat: S-W Pro-Classic Waterborne Acrylic, B31W51 Series
 - iii. 3rd Coat: S-W Pro-Classic Waterborne Acrylic, B31W51 Series (4 mils wet, 2 mils dry per coat)

B. PRECAST CONCRETE UNITS (Pre-Cast Concrete Benches, Caps, Decorative Items)

1. Acrylic Systems

- b. Low Luster Finish
 - i. 1st Coat: S-W H&C Etching Solution or muriatic acid.
 - ii. 2nd Coat: S-W H&C Shield Plus Ultra Acrylic Concrete Stain
 - iii. 3rd Coat: S-W H&C Shield Plus Ultra Acrylic Concrete Stain

C. WET AREAS - (All Toilets and Restrooms CMU walls, Gypsum Board Walls and Ceilings, All Shower Wall and Ceilings, High Moisture Areas). NOTE: Epoxy paint manufacturer shall provide documentation that the epoxy product is tested and approved for application in such locations and for application on the surface material that is being used.

1. Epoxy Systems

- a. Gloss Finish
 - i. 1st Coat CMU: S-W PrepRite Block Filler, B25W25 (tinted and rolled in to fill all pits and pores completely, as required)
 - ii. 1st Coat Gyp. Bd.: S-W PrepRite Classic Latex Primer, B28W101 (4 mils wet, 1.2 mils dry)
 - iii. 2nd Coat: S-W Water Based Catalyzed Epoxy, B73-300 Series (8 mils wet, 4 mils dry)

- iv. 3rd Coat: S-W Water Based Catalyzed Epoxy, B73-300 Series (8 mils wet, 4 mils dry)
- D. FOOD SERVICE AREA - (Food Service CMU Walls, Food Service Plastered Walls, Ceilings, Poured Concrete, Precast Concrete, Unglazed Brick, Cement Board) (See Special Preparations and Special Application requirements)
- 1. Acrylic Enamel Systems
 - c. Semi-Gloss Finish
 - i. 1st and 2nd Coat: S-W PrepRite Block Filler, B25W25 (tinted and rolled in twice to fill all pits and pores completely, as required)
 - ii. 3rd Coat: S-W Pro-Classic Waterborne Acrylic, B31W51 Series
 - iii. 4th Coat: S-W Pro-Classic Waterborne Acrylic, B31W51 Series (4 mils wet, 2 mils dry per coat)
- E. CONCRETE FLOORS – (Shop Floors, Utility Platforms, Custodial Spaces, Stairwells, Equipment Rooms, Boiler Rooms), NOT FOR POLISHED CONCRETE FLOORS.
- 1. Urethane Systems
 - a. Gloss Finish (clear or colored as selected by Architect)
 - i. 1st Coat: Pressure wash
 - ii. 2nd Coat: S-W Armorseal Rexthane I, B65-60 Series
 - iii. 3rd Coat: S-W Armorseal Rexthane I, B65-60 Series (shop floors with anti-slip additive)
- F. METAL - (Structural Steel Columns, Joists, Trusses, Beams, Miscellaneous Structural Steel Members, Miscellaneous & Ornamental Iron, Sashes, Doors, Door Frames, Partitions, Cabinets, Lockers, Radiators, Wall Louvers, Pumps, Motors, Machines, Convector, Ducts [Ventilating], Electrical Raceways & Conduits, Elevator Cabs, Copper, Non-Galvanized Metal)
- 1. Acrylic Systems
 - a. Gloss Finish
 - i. 1st Coat: S-W Pro-Cryl Universal Primer, B66-310 Series (10 mils wet, 4.0 mils dry film thickness)
 - ii. 2nd Coat: S-W Pro Industrial Multi-Surface Acrylic, B66-500 Series
 - iii. 3rd Coat: S-W Pro Industrial Multi-Surface Acrylic, B66-500 Series (4 mils wet, 2 mils dry per coat)
 - 2. Dryfall Alkyd Systems (EXPOSED STRUCTURE WHERE SCHEDULED)
 - a. Gloss Finish (Flat Black in Auditorium, Stage)
 - i. 1st Coat: S-W Kem Bond HS Metal Primer, B50Z Series (8 mils wet, 5 mils dry)

- ii. 2nd Coat: S-W Waterborne Acrylic Dry Fall, B47W65 (8 mils wet, 4 mils dry)
- iii. 3rd Coat: S-W Waterborne Acrylic Dry Fall, B47W65 (8 mils wet, 4 mils dry)

G. METAL - (Galvanized)

2. Acrylic Systems

d. Gloss Finish

- i. Surface Preparation: Refer to Part 3 Surface Preparations of these specifications for Cleaning & Testing/Evaluations; Manufacturer's guidelines and recommendations stand as requirements of this work.
- ii. 1st Coat: Pro-Cryl Universal Primer, B66-310 Series (10 mils wet, 4.0 mils dry film thickness)
- iii. 2nd Coat: S-W Pro Industrial Multi-Surface Acrylic, B66-500 Series
- iv. 3rd Coat: S-W Pro Industrial Multi-Surface Acrylic, B66-500 Series (4 mils wet, 2 mils dry per coat)

H. WOOD - Walls, Ceilings, Doors, Trim, Cabinet Work, Counters, Partitions, Frames [Including Sitka Spruce, Southern Pine, Douglas Fir, Cedar, Redwood, Luan]

1. Stained & Varnished (Clear Finish)

a. Open Grained Wood

- i. 1st Coat: S-W Interior Oil Stain, A48 Series
- ii. 2nd Coat: S-W Sher-Wood Natural Filler, D70T1
- iii. 3rd Coat: S-W Oil Base Varnish, Gloss A66V91
- iv. 4th Coat: S-W Oil Base Varnish, Gloss or Satin A66 Series

b. Closed Grain Wood

- i. 1st Coat: S-W Interior Oil Stain, A48 Series
- ii. 2nd Coat: S-W Oil Base Varnish, Gloss A66V91
- iii. 3rd Coat: S-W Oil Base Varnish, Gloss or Satin A66 Series (4 mils wet, 1.5 mils dry per coat)

I. WOOD - (Floors-Painted, Stained, Varnished, Gym Floors [New], Stage Floors, Heavy Duty Ballroom, Convention, Etc.)

1. Polyurethane Varnish System

a. Gloss Finish (Low Lustre Satin Sheen For Stage Flooring)

- i. 1st Coat: S-W Oil Stain (Ebony Stain for Stage Flooring)
 - ii. 2nd Coat: S-W Polyurethane Varnish, A67V1/A67F1
 - iii. 3rd Coat: S-W Polyurethane Varnish, A67V1/A67F1 (4 mils wet, 1.5 mils dry per coat)
- J. NON-TEXTURED SMOOTH DRYWALL (Walls, Ceilings, Gypsum Board, Wood Pulp Board, Plaster Board, Etc.)
 - 3. Acrylic Enamel Systems
 - a. Base Coat: SHEETROCK Brand First Coat (for equalizing textures)
 - b. Semi-Gloss Finish (UNLESS NOTED OTHERWISE)
 - v. 1st Coat: S-W PrepRite Classic Latex Primer, B28W101 (4 mils wet, 1.2 mils dry)
 - vi. 2nd Coat: S-W Pro-Classic Waterborne Acrylic, B31W51 Series
 - vii. 3rd Coat: S-W Pro-Classic Waterborne Acrylic, B31W51 Series (4 mils wet, 2 mils dry per coat)
- K. TEXTURED DRYWALL (Walls, Ceilings, Gypsum Board, Wood Pulp Board, Plaster Board, Etc.)
 - 4. Acrylic Enamel Systems
 - a. Semi-Gloss Finish
 - i. 1st Coat: S-W PrepRite Classic Latex Primer, B28W101 (4 mils wet, 1.2 mils dry)
 - ii. 2nd Coat: S-W Pro-Classic Waterborne Acrylic, B31W51 Series
 - iii. 3rd Coat: S-W Pro-Classic Waterborne Acrylic, B31W51 Series (4 mils wet, 2 mils dry per coat)
- L. CANVAS PIPE WRAP (exposed to view)
 - 1. Latex Systems
 - a. Flat Finish
 - i. 1st Coat: S-W PrepRite 200 Latex Primer, B28W200 (add fungicidal agent) (4 mils wet, 1.2 mils dry)
 - ii. 2nd Coat: S-W ProMar 200 Latex Flat B30W200 Series (4 mils wet, 2 mils dry)
 - iii. 3rd Coat: S-W ProMar 200 Latex Flat B30W200 Series (4 mils wet, 2 mils dry)

PART 3: EXECUTION

INSPECTION:

Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of manner acceptable to Applicator.

Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

SURFACE PREPARATION:

General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions, SSPC-SP, and as herein specified, for each particular substrate condition.

SSPC-SP: Steel Structures Paint Council Surface Preparation Specification No. #

Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

Wood: Clean wood surfaces to be painted. Remove dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

Ferrous Metals: Clean ferrous surface, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

Touch-up shop-applied primed coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.

Galvanized Surfaces:

Hot-Dipped Galvanizing: Allow hot-dipped galvanized items to weather 6 months prior to surface preparations, and then steam clean per SSPC-SP 1. Do not use hydrocarbon solvents, vinegar or other mild acids for cleaning hot dipped galvanized surfaces. After cleaning, perform spot testing for any manufacturer's pre-treatments, using the procedure from ASTM D2092, Method B201, Volume 06.01. After pre-treatments testing, apply 2' x 2' paint test patch for evaluation of paint surface adhesion. Evaluate the adhesion at three locations of the surface area, by performing a tape adhesion test per ASTM Method D3359. Grade the tape adhesion of the coating by following ratings as set forth in ASTM D3359-97.

Galvalume: Clean free of grease, oil, dirt, soil, and other surface contaminants with hydrocarbon free solvent cleaner. Perform a light brush blasting per SSPC-SP7 if necessary. After cleaning, apply 2' x 2' paint test patch for evaluation of paint surface adhesion. Evaluate the adhesion at three locations of the surface area, by performing a tape adhesion test per ASTM Method D3359. Grade the tape adhesion of the coating by following ratings as set forth in ASTM D3359-97.

Special Food Service Area Wall Preparation: Special preparation will be required to assure that required Food Service area CMU wall surfaces are pointed and patched is in strict accordance with the drawing's CMU surface preparation General Notes for on-site approval by local Health Department. All work resulting from inspection comments and requirements are to be provided at no additional cost.

Previously Coated Surfaces:

Maintenance painting will frequently not permit or require removal of old coatings prior to repainting. However, all surface contaminants such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, efflorescence, and sealers must be removed to assure sound bonding to the tightly adhering old paint. Glossy surfaces of old paint films must be clean and dulled before repainting. Thorough washing with an abrasive cleaner will clean and dull in one operation, or wash thoroughly and dull by sanding. Spot prime any bare areas with appropriate primer. Check for compatibility by applying a test patch of the recommended coating system, covering at least 2 to 3 square feet. Allow to dry one week before testing adhesion per ASTM D3359. If the coating system is incompatible, report findings to Architect.

Existing Stained Wood:

Wood must dry and cleaned of dirt, grease, wax, polish, and marks. Old finishes in poor condition should be completely removed and the surface treated as a new surface. Sand wood to a smooth surface with 100-120 grit paper. Remove sanding dust with a vacuum or tack cloth. Avoid sanding wood that has only stain on it, sanding will remove some of the stain creating an uneven appearance. Sand down bare spots and scratches, and stain to match adjacent color. Very lightly scuff sand between finish coats, 180 grit paper or finer, removing any raised graining. Perform adhesion testing, identifying any presence of any sanding sealer, which can prevent bonding and cause peeling.

LEAD-BASED PAINT RENOVATION, REPAIR, AND PAINTING:

Applicators who perform painting renovations in housing or child occupied facilities built before 1978 must be certified by the Health Hazards Control Unit (HHCU). All work shall comply with requirements as published by the EPA Lead-Based Paint Renovation, Repair and Painting Rule in the Code of Federal Regulations.

Samples: For determining whether components are free of lead-based paint, certified applicators may collect paint chip samples and submit samples to a laboratory recognized by NLLAP for analysis. Required paint chip samples documentation shall be prepared and maintained by the certified applicator for three years.

MATERIALS PREPARATION:

Mix and prepare painting materials in accordance with manufacturer's directions.

Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

APPLICATION:

General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

Special Food Service Area Wall Application: Roll-in two coats of masonry block filler coating in Food Service areas as necessary to completely fill all pits and pores prior to application of top coats. Final finished topcoat in Food Service areas to be free of all pits and pores, with a smooth completely washable surface. Apply additional coats when final coat of paint does not uniformly fill all pits and pores. Provide all work described as necessary to obtain an on-site approval by local Health Department.

Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.

Sand lightly between each succeeding enamel or varnish coat.

Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in occupied spaces.

Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

CLEAN-UP AND PROTECTION:

Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others by protection of their work, after completion of painting operations.

At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

EXTRA STOCK:

Furnish extra paint in manufacturer's sealed shipping containers. Provide one gallon for each type and color of paint applied in the project. Containers shall only be opened by the painter manufacturer/supplier to formulate required colors/mixes. These extra materials shall not be opened or used by the Contractor without written permission from the Owner. Place a label, protected by clear plastic on the lid of each container with the following typewritten information:

1. Paint Manufacturer
2. Product name and number
3. Mixing and color formulation
4. Painting contractor
5. Date that the paint container is put in the Owner's inventory
6. Room or area number where the paint applied was used

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, and Division 1 specifications that apply to the work specified in this Section.

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes: Pre-engineered and pre-finished extruded aluminum walkway covers, canopies, and sun shade awnings.
- B. Related Sections:
 - 1. 03100-Concrete Forms and Accessories
 - 2. 03300-Cast-in-Place Concrete

1.2 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Columns, beams, decking with flat soffits and trim shall be aluminum extrusions. Structural framing shall consist of heli-arc welded, one-piece rigid bents and bolt connected members] with interlocking deck sections secured by screws.
 - 2. Walkway canopies shall be self-draining from decks through bents and down column downspouts to discharge points at ground level as shown on Drawings.
 - 3. Wall supported sun shade awnings shall be self-draining from deck out a built-in outer corner side discharge scupper.
 - 4. Building Code: IBC and North Carolina Building code current editions.
 - 5. Design Loads:
 - a. Comply with Building Code for site location.
 - b. Collateral Loads: Additional loads imposed by other materials or systems identified in contract documents.
 - 4. Structural Design: Prepare complete structural design calculations and detailed design for canopy members and foundations. Provide to Architect within 45 days of Contract Award to General Contractor and coordinate structural work as required with Architect.

1.3 SUBMITTALS

- A. Reference Section 01330-Submittal Procedures; submit following items:
 - 1. Product data.
 - 2. Shop Drawings: Layout and erection drawings showing roof framing, deck panels, cross sections and trim details clearly indicating proper assembly, with foundation design, with Sealed Structural Design Calculations.
 - 3. Samples: Color selection samples consisting of actual coating material or anodizing process on aluminum extrusions.
 - 4. North Carolina regulatory review approval: Structural design and calculations sealed by a structural engineer registered to practice in the state of North Carolina.
 - 5. Quality Assurance/Control Submittals:
 - a. Qualifications: Letter certifying manufacturer's required qualifications.
 - b. Structural Design: Calculations sealed by a structural engineer registered to practice in the state of North Carolina.
 - c. Complete design and detail drawings for canopy and foundations.
 - d. Manufacturer's Installation Instructions.

1.4 QUALITY ASSURANCE

- A. Overall Standards: Structural engineering design documents shall be certified and sealed by a structural engineer registered to practice in the state of North Carolina.
- B. Qualifications:
 - 1. Manufacturer Qualifications: Minimum ten years experience in producing covers/canopies with welded bents and of the type specified.
 - 2. Installer Qualifications: Minimum five years experience in erecting covers/canopies of the type specified. Installations shall be in accordance with manufacturer's shop drawings.

1.5 DELIVERY STORAGE AND HANDLING

- A. Reference Section 01660-Product Storage and Handling Requirements.
- B. Follow manufacturer's instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer / Basis of Design: Mapes Company (Super Lumideck with Flat Soffit system for canopies)

Equivalent products from the following manufacturers are acceptable. Reference AIA A701 Instructions To Bidders - Product Substitution Procedures.

Perfection Architectural Systems, Inc.
E.L. Burns Co., Inc.
Superior Metal Products
Peachtree Protective Covers

2.2 MATERIALS

- A. Aluminum Extrusions: 6063 alloy, T-6 temper.
- B. Grout: 1 part portland cement, 3 parts masonry sand; 2,000 psi (13.8 MPa) compressive strength.
- C. Foam Block-Outs: Rigid foam blocks sized as required for column embedment depth and shape.

2.3 COMPONENTS

- A. Columns:
 - 1. Radius-cornered aluminum tubular extrusions [of size shown on Drawings] [as required by structural engineering design].
 - 2. Grout Key: Provide two 1 ½ inch (38 mm) diameter holes in column base, one each in opposite sides.
 - 3. Provide clear acrylic protection coat on surfaces in contact with grout.
- B. Beams: Open top aluminum tubular extrusions as required by structural engineering design.
- C. Flat Soffit Deck: Rigid-Roll-Lock extruded aluminum, 2 ¾" extruded .018" self-flashing, interlocking sections with flat soffit panels, as required by structural engineering design.
 - 1. Provide welded endplate water dams where sections terminate at other than drainage channels.

- D. Hanger Rods: Powder coated to match canopy awning. Sized and attached as shown in drawings and as required by structural engineering design.
- E. Fascia: Provide manufacturer's standard extruded aluminum fascia and gutter sections as shown on Drawings and as required to complete the installation resulting in a neat finished appearance.
- F. Flashing: Aluminum sheet, thickness as recommended by manufacturer for specific condition.
- G. Conduit Cover: Extruded aluminum pre-finished continuous cap. Anchored down to the roof deck upper section to provide a continuous watertight enclosure for routing of electrical conduits and concealed weather protected roof deck penetrations.

2.4 ACCESSORIES

- A. Fasteners:
 - 1. Deck Screws: No. 14 x 1 inch (25 mm), self tapping, Type 18-8 stainless steel with neoprene washer.
 - 2. Trim Screws: No. 10 x ½ inch (13 mm), self tapping, Type 18-8 stainless steel.

2.5 FABRICATION

- A. Shop Assembly: Fabricate cross beams and columns for field assembled bolted connections.

2.6 FINISH

- A. Finish on all exposed components shall be a Fluoropolymer Coating: 70 percent PVDF resin based fluoropolymer, AA-C-12C-42R-1, equivalent to two-coat Kynar, in compliance with AAMA 2605.
- B. Color: Bronze Anodized; manufacturer's two-coat Kynar fluoropolymer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine footings in which bents will be set and building surfaces to which canopy will connect. Verify footing locations, details and elevations comply with shop drawings.
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory footings or surfaces.
- C. Commencement of work by installer is acceptance of existing conditions.

3.2 ERECTION

- A. Erect canopy in accordance with manufacturer's installation instructions.
- B. Set bents plumb, straight and true to line, adequately braced to maintain position until grout has cured.

3.3 CLEANING

- A. Clean surfaces soiled by work as recommended by manufacturer.
- B. Remove surplus materials and debris from the site.

3.4 PROTECTION

- A. Protect finished aluminum surfaces from damage due to subsequent operations through final acceptance by the Owner.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SCOPE OF WORK:

The scope of work consists of the furnishing and installing of complete electrical systems including miscellaneous systems. The Electrical Contractor (hereafter referred to as "the Contractor", or Electrical Contractor) shall provide all supervision, labor, materials, equipment, machinery, and any and all other items necessary to complete the systems. The Contractor shall note that all items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items of equipment as indicated on the drawings and as required for complete systems.

It is the intention of the Specifications and Drawings to call for finished work, tested and ready for operation.

Any apparatus, appliance, material, or work not shown on the drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered, and installed by the Contractor without additional expenses to the Owner.

Minor details not usually shown or specified, but necessary for proper installation and operation, shall be included in the Contractor's estimate, the same as if herein specified or shown.

With submission of bid, the Contractor shall give written notice to the Architect of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules, and any necessary items or work omitted. In the absence of such written notice, it is mutually agreed that the Contractor has included the cost of all required items in his proposal, and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensation.

NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS, SUPPLEMENTARY INSTRUCTIONS, GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS, SPECIAL CONDITIONS, GENERAL REQUIREMENTS bound in the front of this document are included as a part of the specifications for this work.

ELECTRICAL DRAWINGS AND SPECIFICATIONS:

The electrical drawings are diagrammatic and indicate the general arrangement of fixtures, equipment, and work included in the contract. Consult the architectural, structural and mechanical drawings and details for exact location and dimensions of fixtures and equipment; where same are not definitely located, obtain this information from the Architect.

The Contractor shall follow drawings in laying out work and check drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, the Architect shall be notified before proceeding with installation. If directed by the Architect, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

The plans and these specifications are intended to describe, imply and convey the materials and equipment as well as necessary labor, required for the installation as outlined in the paragraph entitled "Scope of Work". Any omissions from either the drawings or these specifications are unintentional, and it shall be the responsibility of this Contractor to call to the attention of the Architect or Engineer any pertinent omissions before submission of a bid. The drawings which accompany these specifications are not intended to show in complete detail every fitting which may be required; however wherever reasonable implied by the nature of

the work, any such material or equipment shall be installed by this Contractor as a part of his contract price. In no case will any extra charge be allowed unless authorized in writing by the Architect or Engineer.

The Contractor shall arrange with the General Contractor for required concrete and masonry chases, openings, and sub-bases so as not to delay progress of work. Work shall be installed sufficiently in advance of other construction to conceal piping and to permit work to be built in where required.

It shall be understood and agreed by all parties that where the words "Furnish", "Install", and / or "Provide" appear, the following definitions apply:

Furnish - to supply or give.

Install - to place, establish or fix in position.

Provide - to furnish and install as defined above.

CODES, PERMITS, AND FEES:

The Contractor shall give all necessary notices, including electric and telephone utilities, obtain all permits, and pay all government taxes, fees, and other costs, including utility connections or extensions in connection with his work file all necessary plans, prepare all documents, and obtain all necessary approvals of all governmental departments having jurisdiction at each phase of construction as required; obtain all required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment for the work.

The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings (in addition to contract drawing and documents) in order to comply with all applicable laws, ordinances, rules, and regulations, whether or not shown on drawings and / or specified.

All work and materials under this section shall be in strict compliance with more stringent requirements of the North Carolina State Building Code, including the National Electrical Code, NFPA 101-Life Safety Code, Regulations of the State Fire Marshall, UL Directory of Electrical Construction Materials, and requirements of the local utility company.

VERIFICATION OF DIMENSIONS, DETAILS, EXISTING FIELD CONDITIONS:

The Contractor shall visit the premises prior to bidding, and thoroughly familiarize himself with all details of the work, working conditions, verify dimensions in the field, provide advice of any discrepancy, and submit shop drawings of any changes he proposes to make in quadruplicate for approval before starting any work. The Contractor shall install all equipment in a manner to avoid building interference.

CORRDINATION WITH EQUIPMENT PROVIDED BY OTHERS:

Electrical contractor shall coordinate voltage, phase and amperage requirements for all Plumbing, HVAC, and Kitchen equipment with the sub-contractor providing the equipment prior to ordering electrical gear submittals. Make adjustments to panels, feeders, and breakers as necessary to feed actual equipment being provided. Make engineer/architect aware of any conflicts or issues.

ACCEPTABLE MANUFACTURERS:

Acceptable manufacturers, as specified in the Contract Documents, implies that the specified manufacturer may produce acceptable products equal in quality of materials and performance to such item specified. The Contractor will be required to provide products meeting, or exceeding the "Standard of Quality and Performance" as dictated by the product selection noted. However, any changes which result (from substitution of other manufacturers) in the electrical work or work of other Contractors, shall be paid for by the Contractor.

SHOP DRAWINGS:

The Contractor shall submit five (5) copies of the shop drawings to the Architect for approval within thirty (30) days after the award of the general contract. If such a schedule cannot be met, the Contractor may request in writing for an extension of time to the Architect. If the Contractor does not submit shop drawings in the prescribed time, the Architect has the right to select the equipment.

Provide manufacturer's cuts of items to be provided under this Contract. Included, but not limited to these items, are any of the following which may be required in this Contract: Fixtures, switches, outlet boxes, device plates, panelboards, transformers, conductors, pull boxes, wiring troughs, circuit breakers, disconnect switches, emergency fixtures, receptacles, etc.

The shop drawings shall be neatly bound in five (5) sets and submitted to the Architect with a letter of transmittal. The letter of transmittal shall list each item submitted along with the manufacturer's name.

Approval rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the contract drawings and specifications.

COORDINATION WITH OTHER TRADES:

Coordinate all work required under this section with work of other sections of the specifications to avoid interference. Bidders are cautioned to check their equipment against space available as indicated on drawings, and shall make sure that proposed equipment can be accommodated. If interferences occur, Contractor shall bring them to attention in writing, prior to signing of contract; or, Contractor shall at his own expense provide proper materials, equipment, and labor to correct any damage due to defects in his work caused by such interference.

INSPECTION AND CERTIFICATES:

On the completion of the entire installation, the approval of the Architect and Owner shall be secured, covering the installation throughout. The Contractor shall obtain and pay for Certificate of Approval from the public authorities having jurisdiction. A final inspection certificate shall be submitted to the Architect prior to final payment. Any and all costs incurred for fees shall be paid by the Contractor.

EQUIVALENTS:

When material or equipment is mentioned by name, it shall form the basis of the Contract. When approved by the Architect in writing, other material and equipment may be used in place of those specified, but written application for such substitutions shall be made to the Architect as described in the Bidding Documents. The difference in cost of substitute material or equipment shall be given when making such request. Approval of substitute is, of course, contingent on same meeting specified requirements and being of such design and dimensions as to comply with space requirements.

EXCAVATING AND BACKFILLING FOR ELECTRICAL WORK:

Refer to Sections 02202, 02220 and 15150.

CUTTING AND PATCHING:

On new work, the Electrical Contractor shall furnish sketches to the General Contractor showing the locations and sizes of all openings and chases, and furnish and locate all sleeves and inserts required for the installation of the electrical work before the walls, floors, and roof are built. The Electrical Contractor shall be responsible for the cost of cutting and patching where any electrical items were not installed or where incorrectly sized

or located. The Contractor shall do all drilling required for the installation of his hangers. See also Section 01050.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

CONDUIT SYSTEM:

Furnish and install all conduits, or other raceways, fittings, boxes, and other component parts specified or required for completion and proper operation of the conduit system shown on the drawings.

Other than as noted above, conduit shall be sized in accordance with the 2005 NEC. All conduit shall be neatly installed parallel to, or at right angles to beams, walls and floors of the building in a neat and workmanlike manner. All bends shall be made with standard conduit elbows or conduit bent to not less than the same radius as that of a standard conduit elbow. Conduits shall be supported at intervals not greater than 8' and within 3' of any bend, cabinet, outlet or junction box. Conduits shall be supported by approved pipe straps or clamps, secured by means of toggle bolts on hollow masonry, expansion shields and machine screws or standard pre-set inserts on concrete or solid masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction.

Conduit 1/2" (minimum) and larger shall be electrical metallic tubing (EMT). EMT shall be cold-rolled steel tubing with a coating on the outside and protected on the inside by a zinc, enamel, or equivalent corrosion-resistant coating and conforming to the requirements of ANSI C 80.3-1966 or later edition. EMT may be installed in dry construction in furred spaces, in partitions other than concrete and solid plaster, or for exposed work except on mechanical structures or supports, or in refrigerated areas. EMT shall not be installed where: it will be subject to physical damage; where it will be installed nearer than 4' from finished floor in exposed areas; where it will be subject to severe corrosive influence; where the trade size is larger than 2"; or where tubing, elbows, couplings, and fittings would be in concrete or indirect contact with the earth. Electric metallic tubing fittings shall be all plated steel hexagonal threaded compression type, with insulated throats. No pot metal, set screw, or indenter fittings shall be used.

Connections to lighting fixtures will be permitted with flexible steel conduit strapped every 6'-0", with UL listed AC type cables, used in strict accordance with 2005 NEC Article 333. Armored Cable assembly shall encase conductors in a continuous length of galvanized cold rolled steel strip, spirally wound with adjacent strips locked to turn all edges inward. The ends shall be terminated with fiber bushings to protect conductors from sharp edges. Fittings shall be the insulated throat type, T & B 3100 series or equivalent.

All underground conduit shall be UL Listed Schedule 40 PVC conforming to Article 347 of the 2005 NEC, or rigid galvanized steel. At the Contractor's option, this installation may consist of rigid steel conduit with PVC coating, minimum of 15 mils of PVC. Where schedule 40 PVC is installed under floor slabs, the elbows required to turn the raceway up into cabinets, equipment, etc., shall be of rigid steel. A copper ground wire shall be installed in all PVC conduits. PVC conduit shall not be used above the floor slab, unless roughed-in masonry wall.

All exposed conduit to 5'-0" above finish floor shall be rigid galvanized steel or IMC conduit. Liquid-tight flexible steel conduit with an extruded PVC jacket shall be used for connections to exterior motors and compressors. Liquid-tight flexible conduit fittings shall be insulated throat type, Appleton STB type or equal.

All permanent conduit stub-outs shall be sealed with galvanized standard water pipe caps immediately after installation. All conduits crossing expansion joints shall have approved type expansion fittings as manufactured by Crouse Hinds, Killark or Appleton. Fittings shall be of type to ensure ground continuity. Provide a 240 lb. tensile strength poly pull-wire in all empty conduits.

OUTLETS AND PULL BOXES:

All boxes shall be UL labeled or listed by an approved agency. At each location where required, an outlet box of a type to suit the intended use shall be installed. Boxes shall be fastened to building structure in an approved manner. Flush outlet, junction and pull boxes shall be pressed galvanized or sheradized steel, either square or octagonal with knockouts on tops and sides, and fitted with plaster covers where necessary to set flush with the finished surface. For use in hollow-core masonry walls, switch boxes shall be of sufficient depth to permit conduit to rise in the core with minimum cutting of block. Provide plaster rings or box extensions for flush devices with finish surface. Boxes for unplastered masonry walls shall be masonry type with device mounting ears on the interior of the box.

Convenience outlet boxes shall be generally mounted approximately 18" above floor, 48" above floor in mechanical equipment rooms and shop type areas, and 4" above counter backsplash, unless otherwise noted. Convenience outlets for drinking fountains shall be installed behind fountain enclosure so as not to be visible; coordinate with Plumbing Contractor.

Lighting switch outlet boxes shall be 4' above floor, unless noted or required otherwise. Where switches occur in 4' high tile walls, they shall be lowered by 6 inches.

Pull boxes shall be used as required in long runs of conduit to facilitate pulling of wires. All interior pull boxes shall be constructed of code gauge galvanized sheet metal, and not less than the minimum size recommended by the NEC. Boxes shall be furnished with screw-fastened covers. When several feeders pass through a common pull box they shall be tagged to indicate clearly their electrical characteristics, circuit number, and panel designation. Wire markers shall be as manufactured by W. H. Brady Co., or equal. In no case shall a pull box be installed in an inaccessible location. Boxes shall be provided with fixed or removable steel barriers for each circuit where two or more feeders pass through the box. In case of banked conduit runs consisting of more than two horizontal rows of conduits, where barriers would be impracticable, the cables for each conduit shall be tied together with heavy waxed twine and wrapped with one wrap of heavy grade tape.

Where two or more outlets are to be installed in one location, they shall be installed in gang boxes suitable for the intended purpose.

Outlet boxes for outdoor use, and for exposed use where not covered by fixture canopies, shall be cast metal suitable for the intended purpose, having integral threaded hubs, and of the weatherproof type with gasket. Provide special outlet boxes where indicated.

All junction boxes shall be marked with panel and circuit number which it contains.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

CONDUCTORS FOR 600 VOLTS OR LESS:

All conductors shall be copper with a minimum conductivity of 98% and shall be delivered to the job site in their original packages, marked or tagged as follows : UL label , size, type, and insulation of the wire; name of manufacturer and trade name of the conductor: and date of manufacture. All conductors shall be insulated for 600 volts unless otherwise indicated. Furnish and install all conductors specified or required for completion and proper operation of the various systems shown on the drawings.

Conductors shall be 600 volt type THW or THWN. Branch circuit conductor shall not be smaller than No. 12 AWG, except where specifically noted otherwise. Home runs originating more than 80' at 120 volts from panel location shall be No. 10 AWG minimum size. Wires No. 10 AWG and smaller shall be solid; wires No. 8 AWG and larger shall be stranded. Where branch circuits are fed through fluorescent fixture channels, use code grade type THHN or XHHW. All AC cables where permitted shall include a separate copper ground conductor sized per phase conductors.

Provisions of Section 210-5, Color Code, NEC, shall be strictly complied with. Color coding shall include feeders and mains and be consistent throughout entire system. For 120/208 volt systems, use black, red, and blue for phases A, B, & C respectively. For 277/480 volt systems, use brown, orange, and yellow for phases A, B, & C respectively.

All conductors in vertical raceways shall be properly supported at intervals not greater than those specified in Section 300-19 of NEC.

All wire and cable except as specifically stated otherwise, shall be of one of the following makes: Anaconda Wire and Cable Co., General Cable Corp., General Electric Co., or Okonite Co.

JOINTS AND CONNECTIONS:

The Engineer reserves the right to inspect any and all joints made in wiring. If they are taped prior to being inspected, the tape shall be removed as ordered from any joint or joints for inspection. After inspection and correction of any fault found, the Contractor shall properly retape the joints.

Conductors shall be continuous without joints or splices in runs between outlet boxes. All splices shall be made at boxes only. Where stranded conductors are to be connected to any apparatus, bus work, switches or fuse blocks, they shall be connected by suitable mechanical solderless type lugs or spades. All lugs shall be permanently bolted in such position as to give maximum contact surface available. Where multiple circuits are run from same switch or panel, individual lugs for each conductor shall be used. Feeder taps in junction boxes or panel gutter shall be made with insulated cover panel gutter taps. Feeder conductors shall not be spliced, feeder conductors shall be continuous for the length of run.

Solid conductors, namely those sized #10 and #12 AWG copper, shall be spliced by using Ideal "wire-nuts", 3M Co. "Scotchlok", or T & B "Piggy" connectors for branch circuit splices in junction boxes and light fixtures, except recessed fixtures as noted above. "Sta-Kon" or other other permanent type crimp connectors shall not be used.

Stranded conductors, namely #8 AWG copper and larger, shall be spliced by approved mechanical connectors plus gum tape, plus friction or plastic tape. Solderless mechanical connectors, for splices and taps, provided with UL approved insulating covers, may be used instead of mechanical connectors plus tape.

DEVICE PLATES:

A device plate shall be provided for each outlet to suit the device installed. All plates shall be no. 302 stainless steel construction. All plates shall be "jumbo" size.

Device plates shall be of the one piece type, of suitable shape for the devices to be covered. The use of sectional device plates will not be permitted. Plates having a .375" bushed hole in the center shall be installed on all wall mounted outlets for telephones.

Devices and/or plates installed prior to painting shall be properly taped and shall be cleaned after painting, if necessary. Blank plates shall be installed on all unused outlets.

Plates shall be manufactured by Pass & Seymour, Bryant, or Hubbell. Provide sample of plates to Architect for approval.

RECEPTACLES:

Duplex convenience outlets for general use shall be rated 20 amperes, 125 volts, duplex, for standard parallel blade three-wire grounded type caps, Hubbell No. 5362-I (ivory), or approved equal. Color to be selected by Architect. Where outlets are installed vertically, ground plug position shall be on top and on right side where outlets are installed horizontally.

SPECIAL USE RECEPTACLES:

Provide special receptacles including receptacles with ground fault circuit interrupter protection, where needed, as required by equipment. Provide MOV-based transient voltage surge suppression devices (SS), where shown on plan. Tamper-resistant receptacles (TP) shall prevent insertion of objects other than a properly rated 2 or 3 wire plug using "floating" shutters. Equal devices by Hubbell, Pass & Seymour or Arrow-Hart are considered acceptable.

WALL SWITCHES:

Wall switches shall be installed as shown on the drawings and shall be connected to provide control of the outlets indicated. Switches shall be rated at 20 amperes for 120 volts or 277 volts lighting circuits. Hubbell No. 1221 (or 1221-1), for single pole; Hubbell Catalog No. 1223 (or 1223-1) for 3-way; Hubbell Catalog No. 1224 (or 1224-1) for 4-way. Weather-proof switches shall be Hubbell No. 1781 single pole or Hubbell No. 1783 3-way. Provide sample of switches to Engineer for approval. Color of switches to be selected by Architect.

Automatic light switches shall have passive infra-red occupancy switch with light sensor to prevent light from switching on when daylight is above pre-set level. Switch shall be UL listed, have adjustable time delay of 30 seconds to 30 minutes, auto/off control, and minimum coverage of 900 square feet, Automatic light switch shall be UNENCO model no. D-IS.

Provide special purpose switches where noted on the drawings, or elsewhere. Equal devices by Pass & Seymour or Arrow-Hart are considered acceptable.

For wall switches indicated as dimmers on LED lighting, coordinate the exact 0-10 volt dimmer that is compatible with LED driver at 277V for the specific fixtures provided. Install the correct size wall box to accommodate the specific dimmer to be installed.

END OF SECTION

SERVICE EQUIPMENT AND POWER DISTRIBUTION:

Furnish, install and completely connect the circuit breaker type service, panelboard and distribution equipment as indicated. All construction shall meet applicable standards of ANSI, IEEE, and NEMA, and all equipment shall bear UL label insofar as it is available. Equipment shall be Square D QED, I-Line or QMB; equipment manufactured by Cutler-Hammer (Eaton), General Electric, or ITE Siemens will be considered equal.

Provide an insulated neutral bus in the Main Distribution Panel which shall be the source for all insulated neutral conductors of the system. Jumpers shall be installed to connect the insulated neutral bus to the uninsulated grounding bus. The uninsulated grounding bus shall be the source of grounds for all grounding and bonding (not neutrals) of equipment.

LIGHTING AND POWER PANELBOARDS:

Panelboards shall be of the thermal-magnetic circuit-breaker type and shall consist of an assembly of single, double, and triple-pole breakers. Each circuit-breaker shall be bolted-in, removable without disturbing the adjacent units and shall have trip ratings as indicated. All multipole breakers shall be common trip. Ground fault circuit breakers shall be used as indicated on the drawings.

Each panelboard shall be installed in an appropriate cabinet of sufficient size with top 6'-0" above finish floor and shall conform to the requirements of UL standard for cabinets and boxes. Standard cabinets with surface or flush type trim and door shall be used, as required. Cabinets shall have a minimum width of 20" unless noted otherwise. A neutral bar shall be provided in each panel with a terminal for each breaker. Grounding lugs shall be provided.

Cabinet shall be made of spot welded galvanized sheet steel not less than N.E.C. gauge with hinged door and trim of the same material. When closed, the door shall fit accurately in the opening provided and present a flush finish with the trim. The door shall be equipped with a key operated lock. Furnish one key with each lock. All door locks shall be keyed alike. Knockouts in cabinets are not acceptable. Cabinets shall be finished with manufacturer's standard painted finish.

On the inside of each door, a typewritten directory identifying each circuit shall be mounted in a suitable protective enclosure. Panelboards shall have laminated plastic designations on inside corresponding to feeder and drawing identifications.

Panelboards shall be Square D I-Line or NQOD Series or equal by Cutler-Hammer, General Electric, or Siemens.

SURGE PROTECTION:

Furnish and install transient voltage surge suppressor (TVSS) units where indicated on the drawing risers as 'SP' to protect AC electrical circuits from the detrimental effects of lightning, utility switching transients, AC motor transients, and other internal generated transients. TVSS shall comply with UL 1449, have a Category C pulse life for all protection modes (L-N, L-G or L-L where applicable), shall operate bio-directionally, and shall have a maximum single pulse current capacity of 50 KA per mode in accordance with NEMA LS1-1992. Acceptable manufacturers include Leibert, Current Technology, LEA, and United Power. Provide complete shop drawing submittal including installation instructions, dimensional drawings, clamp voltage data, and 3rd party data confirming single pulse current capacity rating. Provide on-site manufacturer's testing and start-up.

SAFETY DISCONNECT SWITCHES:

Disconnect switches shall be horsepower rated, installed where indicated and / or required by the NEC. Switches, except where shown as beined by other sections shall be furnished under this Section. Switches shall be heavy duty, fused unless otherwise noted, sized as shown, quick-make, quick-break, NEMA type "ND" with NEMA 1 enclosure, type HD, Square D. Switches to be installed outdoors shall be NEMA type 3R,

with raintight conduit hubs. All switches shall be capable of being locked in the "off" position. Fuses shall be one-time, non-renewable types, dual-element, time-delay, Bussman or equal as required for application.

MOTOR STARTERS:

Motor controllers shall, unless otherwise specifically noted, be combination magnetic type, with thermal overload relays and heaters in each phase conductor, with operating coils for 120 volts as noted on the drawings or as required. Maximum trip rating of starters for hermetic motors shall be at least 105% of the nameplate full load current of the motor.

Starters shall be provided with build-in selector switches (H-O-A) or pushbutton stations where required. Combination starters shall be provided with sufficient auxiliary contacts or control relays for control sequence as specified, indicated or as required, and with sufficient auxiliary contacts on its circuit breaker or with control relays so that opening the circuit breaker ahead of the starter unit opens all hot control lines within the starters. All starters furnished under this Section shall be mounted in individual NEMA I enclosures, unless otherwise specified or indicated on drawings. Special requirements are specified in the separate Sections of this Division or indicated on the drawings.

LIGHTING CONTACTORS:

Each lighting contactor shall have heavy-duty ballast load rated contacts. Each contactor shall have mechanically held contacts, and silver cadmium oxide double break contacts. Contacts shall be field convertible with normally open and normally closed indicators. Each contactor shall be UL listed and CSA certified. All new lighting contactors for each new building shall be housed in a properly sized NEMA-1 enclosure with fully hinged and lockable door.

FIRE ALARM & HVAC CONTROLS:

Electrical contractor is responsible for all conduit and wiring required to power any fire alarm control or booster panels, magnetic door holders, and the HVAC Building Automation Controls system cabinets. There shall be at least (2) Fire Alarm and (2) HVAC control system circuits per wing of the school. Coordinate exact location and quantity of cabinets with Fire Alarm and Mechanical's Controls Sub-Contractor. Termination to Fire Alarm and HVAC controllers and to HVAC equipment shall be by controls contractor. Electrician shall use 1P-20A circuits designated as HVAC Controls on panel schedules or the closest available spare 1P-20A (120V) breakers for powering the controls system. Notify Engineer if circuits were not indicated and update panel directories on Record Drawings.

GROUNDING:

Provide a bare stranded continuous copper grounded conductor, size as indicated, from the service equipment grounding bus to the cold water service main where it enters the building ahead of main valve on water pipe main. Also, provide a driven ground per NEC 250-81 (a). Provide all necessary grounding clamps and full size jumpers around all valves, meters, and similar fittings between point of connection and street main. The main grounding conductor shall be connected to the neutral conductor at one location only, within and on the low voltage side of the main transformer and more specifically the equipment grounding bus associated with the main insulated neutral bus in the MDP. The insulated neutral bus must be insulated and serve to provide the neutral source for all the insulated neutral conductors of the system. Jumpers shall be installed to connect the insulated neutral bus to the uninsulated grounding bus and all grounding and bonding of equipment (not neutrals) shall be attached to the uninsulated grounding bus.

System and equipment grounds shall be checked for proper value of resistance using the Megger ground tester in accordance with the method prescribed by the manufacturer of the instruments. Resistance of ground shall not be in excess of 25 ohms, measured to include the grounding cable. The Contractor shall report the results of these tests to the Engineer in writing. If the resistance cannot be reduced to the value prescribed above, further instructions will be given the Contractor.

All equipment connected under this section shall be grounded and shall conform with the more stringent requirements of the NEC, National Electrical Safety Code, the N. C. State Building Code, or this specification.

Panels, junction boxes, safety switches, disconnect switches, contactors, starters, motors, dry transformers, bus duct and other equipment shall be bonded to the conduit system with a grounding conductor by means of grounding locknuts and bushings as required hereinafter, except where conduit terminates in threaded hub or fittings. All joints or terminations shall be made with standard tapered pipe threads drawn tight to preserve electrical continuity.

Provide grounding bushings and copper jumpers across all concentric or eccentric knockouts and on all conduits larger than 1". Elsewhere, double-lock-nuts with plastic or fiber bushings, or a single lock-nut and malleable bushing may be used. If Contractor selects to use a single locknut and malleable bushing, care shall be taken that the full number of threads project through to permit the bushing to pull tight against the ends of the conduit, after which the lock-nut shall be made up sufficiently tight to draw the bushing into firm electrical contact with the box.

Where flexible conduits are used, provide grounding conductor within flexible conduit to insure continuity of ground. Minimum size of jumper around flex shall be No. 10.

EQUIPMENT IDENTIFICATION:

Provide black-on-white laminated plastic name plates for each switch or circuit breaker on service equipment, disconnect switches, terminal cabinets, panelboards and wiring troughs. The name plate shall be engraved to indicate the equipment controlled or identified. Name plates shall be securely fastened to equipment using two screws.

CONNECTIONS TO EQUIPMENT:

The Contractor shall provide rough-in, junction box, disconnect switch, motor starters, or wiring trough as indicated and final connection as required, which will provide the source of power for equipment furnished under Division 15 of these specifications. Coordinate all equipment locations as required. Consult all Contract drawings which may affect location of equipment or apparatus furnished by others and make any minor adjustments as required.

Electrical Contractor must closely coordinate with the equipment supplier regarding Voltage, H. P., F. L. A., outlet mounting heights, connection cord plug-receptacle electrode configurations and other special wiring requirements.

Electrical Contractor is responsible for coordinating quantity and location of all sprinkler system devices with sprinkler contractor.

Electrical Contractor shall review the Architectural, Civil, Plumbing, Mechanical, Fire Alarm and IC plans to provide branch circuits and final connections to powered equipment furnished by others for complete and operational equipment. This is a sample list and may not represent all connections required:

- 1) MDF & IDF equipment racks
- 2) Data Equipment Racks not in MDF or IDF rooms.
- 3) HVAC Controls Equipment
- 4) Projectors and associated screens
- 5) Hand Dryers
- 6) Electric Water Heaters & Associated Recirculation Pumps
- 7) Dishwasher (Kitchen or Science Prep)
- 8) Fire Pumps (Main and Jockey)
- 9) Powered Hotboxes (See Civil Site Plan for exact locations)

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

LIGHTING FIXTURES:

Furnish and install all lighting fixtures as indicated on the drawings. Fixtures shall be complete with globe or reflector, and lamps, and wired ready for operation at the completion of installation. All fixtures shall have UL approval under their latest rulings indicating that fixture is approved for the intended usage. This Contractor shall provide proper fixture frames to suit type and dimensions of ceilings, confirming ceiling data with Contractor prior to ordering fixtures.

All fixtures shall be self-supporting, independent of the suspended ceiling. Fixtures shall be secured to the structure at a minimum of two points at opposing ends by wire equal to gauge of wire suspending the ceiling. Where fixture channels are joined to form a continuous length, provide one hanger at each end of the run and at each joint. Damaged fixtures shall be replaced at Contractor's expense.

ELECTRONIC BALLAST:

Fluorescent ballasts shall be high power factor electronic ballasts where indicated on schedule, designed for the rapid start operation of T8 lamps. Electronic ballast shall have a frequency of operation of 20 KHZ or greater, and operate without visible flicker. Ballast shall be UL listed Class P, CSA certified, sound rated "A", withstand line transients as defined in ANSE/IEEE C62-41 Category A, and meet FCC requirements of Rules and Regulations, Part 18 for non-consumer equipment. Electronic ballast casing temperature shall not exceed a 25°C rise over 40°C ambient temperature or not exceed 85°C total. Electronic ballasts shall be by Advance Transformer Co., model Mark V or approved equal by Motorola or Magnetek.

LAMPS:

All lamps shall be as manufactured by Sylvania, Phillips, or General Electric Co.. Incandescent lamps shall be inside frosted 130V extended service unless otherwise noted. The Contractor shall be responsible for replacing all lamps which burn out during warranty period starting after Owner accepts project.

Unless indicated otherwise on drawings, fluorescent lamps shall be rapid start energy saving 3100 K coloring rendering index 85 or better.

High pressure sodium lamps shall be GE "Lucalox" series or equal with median value of rated life no less than 24,000 hours.

EMERGENCY LIGHTING:

Furnish and install specified battery-powered emergency lighting units where indicated on the plans. Emergency lighting unit shall comply with the State of North Carolina Department of Insurance Document entitled "Requirements for Battery Powered Emergency Lighting Units" dated 20 March 1995 and all subsequent addenda. Fixture shall have test light and switch accessible and visible from floor.

EXIT LIGHTING:

Furnish and install LED emergency exit sign with battery backup, brown-out protection, pilot light, test switch, and regulated power supply, where indicated on the plans unless specified otherwise. Exit signs shall comply with the State of North Carolina Department of Insurance Document entitled "Requirements for Electrically Powered Exit Signs" dated 20 March 1995 and all subsequent addenda.

EXIT & EMERGENCY LIGHTING CONTROLS:

Contractor shall make provisions for Building Automation System (BAS) under Division 15 to exercise batteries on 21 to 28 day cycles. Coordinate with MC during rough-in as required with junction box for low voltage input to contactor.

LIGHTING CONTACTORS:

Each lighting contactor shall have heavy-duty ballast load rated contacts. Each contactor shall be normally closed contacts with mechanically held operators for open position, and silver cadmium oxide double break contacts. Contacts shall be field convertible with normally open and normally closed indicators. Each contactor shall be UL listed and CSA certified. All new lighting contactors for each new building shall be housed in a properly sized NEMA-1 enclosure with fully hinged and lockable door.

OUTDOOR LIGHTING CONTROLS:

For outdoor lighting applications, furnish and install contactors rated for load and photocells. Contractor shall make provisions for Building Automation System (BAS) or energy management control. Coordinate with MC during rough-in as required with junction box for low voltage input to contactor.

Photocells where indicated on drawing, shall be mounted in weather-proof enclosure under eastern facing eaves/overhangs with turn-on / off operations at 3-5 fc. Photocell shall be intermatic type K4221, for 120V and K4233 for 277V applications. Acceptable manufacturers are Tork, Intermatic, or Paragon. Photo cells shall not control luminaires directly all luminaires shall be controlled through a lighting contactor. Coordinate photocell specified with contactor coil rating.

END OF SECTION

SECURITY SYSTEM

Furnish and install all labor, materials and programming to provide complete and operational building security system.

The Scope of Work shall include:

- a. Access Control Contractor shall use intrusion software compatible with existing systems currently being utilized by the school system. Verify with owner prior to bid.
- b. Access Control Contractor shall include (1) range testing device for each type of wireless security device and verify all devices are within operational range of their controlling device. Make provision for supplying additional controllers as required to provide a fully operational system.
- c. Provide dual technology sensors with passive infrared motion and microwave sensing where indicated on the drawings, all corridors, connectors, and dining areas
- d. Receive coded signal from Fire Alarm panel (excluding "trouble status").
- e. Provide coded signal from Fire Alarm panel (excluding "trouble status") to indicate alarm status on GFAA.
- f. Communicator programmed to contact Owner's specified monitoring service.
- g. Vandal-proof controller enclosure.
- h. Security Cameras shall be Panasonic or equals approved by owner and engineer.
 - a. Exterior 4K – WV-SF781L
 - b. Exterior PTZ – WV-397A
 - c. Exterior Fixed – WV-SFV631L
 - d. Interior/Hallway – WV-SFV631L
- i. Provide recorders as necessary to accommodate the quantity of inputs required on the job. Match the make and model of any existing recorders. Include all mounting hardware and ASM software.

Access Control and Security System shall be installed by a S2 factory-authorized service organization with minimum five years of successful public school installation experience and licensed in N.C.

Access Control and Security System controllers and programming shall be by S2 to match existing school system equipment.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

TESTS:

Test all lines to be concealed before burying or covering with new construction. Tests shall include proper operation of lights, receptacles, and equipment, continuity of conduit system, insulation leakage and impedance, elimination of motor single phasing or reverse rotation, and ground system resistance (see also Section 16400).

After the interior wiring system is completed and at such time as the Engineer or Owner's representative may direct, the Contractor shall conduct an operating test for approval. The tests shall be performed in the presence of the authorized representative of the Engineer and the installation shall be demonstrated to operate in accordance with the requirements of this specification. The Contractor shall furnish all instruments and personnel required for the test. The Contractor shall have sufficient tools and personnel available at the scheduled inspection to remove panel fronts, device plates, etc., as required for proper inspection of equipment, devices and wiring installation as may be required by the inspectors. Any material or workmanship which does not meet with approval of the engineer shall be promptly removed, repaired or replaced as directed, at no additional cost to the Owner.

ADJUSTMENTS:

Adjustments shall include load balancing of all electrical phases, at devices and panels. Balance all panelboards so that the maximum deviation of any one phase from the average of all the phases shall not exceed 10%. Re-type circuit directory as required after completion of adjustment.

CLEANING AND PAINTING:

Prior to final inspection, all equipment having factory finishes shall be thoroughly cleaned inside and outside. All damaged surfaces shall be replaced or refinished by Contractor, with paint same as original manufacturer. Engineer shall determine whether the damaged surface is to be replaced or painted.

RECORD DRAWINGS:

The Contractor shall maintain accurate records of all deviations in work as actually installed from work indicated on the drawings. On completion of the project, two (2) complete sets of marked-up prints shall be delivered to the Architect.

OPERATING AND MAINTENANCE INSTRUCTIONS:

Unless directed otherwise elsewhere in these specifications, the Contractor shall compile and bind three sets of all manufacturer's instructions and descriptive literature on all items of equipment furnished under this work. These instructions shall be delivered to the Engineer for approval prior to final inspection. Instructions shall include operating and testing procedures and a parts list of all equipment. The Contractor shall instruct the Owner's personnel in the proper operation of all systems and equipment. The front and side of the binder shall be titled "Electrical Operating and Maintenance Instructions", with name of the job and firm name of the Contractor.

WARRANTY:

The Contractor shall submit upon completion of the work, a warranty by his acceptance of the contract, that all work installed will be free from defects in workmanship and materials. If, during the period of one year, or as otherwise specified from date of Certificate of Completion and acceptance of work, any such defects in

workmanship, materials, or performance appear, the Contractor shall, without cost to the Owner, remedy such defects within reasonable time to be specified in notice from the Architect. In default, the Owner may have such work done and charge cost to Contractor.

END OF SECTION

END OF SPECIFICATIONS

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SCOPE OF WORK:

The scope of work consists of the furnishing and installing of complete integrated communication systems including other miscellaneous systems. The Technology Contractor (hereafter referred to as "the Contractor", or Technology Contractor) shall provide all supervision, labor, materials, equipment, machinery, and any and all other items necessary to complete the systems. The Contractor shall note that all items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items of equipment as indicated on the drawings and as required for complete systems.

DESCRIPTION OF WORK:

It is the purpose of this specification to require the furnishing of the highest quality materials, equipment, and workmanship available, to fulfill the requirements of the work specified herein.

The Integrated Technology System encompasses the Integrated Communications System, Data Network Systems, Streaming Audio/Video Systems, etc., as specified in Division 17. The Integrated Technology System (ITS) shall provide an Integrated Telephone, Classroom and Administrative Intercommunication System, a Master Clock and Class Period Scheduler, a collapsed Fiber Optic Backbone / Cat 6 Ethernet Data Infrastructure, Media Management Software & Distribution System, providing advanced classroom control of audio/visual equipment located at a central location in the Media Center. Work Included as follows:

1. The work consists of providing all labor, equipment, supplies, materials, and incidentals and in performing all operations necessary for the "TURNKEY", fully operational, and completed installation of an Integrated Technology System, in complete accordance with the Contract Documents.
2. The base bid work shall include, but not be limited to, the following:
 - a. Provide all appropriate licenses for system as installed
 - b. Coordination of the Raceway installation with Division 16 Contractor
 - c. Furnish and Install specified data network system
 - d. Provide ICS network equipment (equipment shall be equal in quality and performance to Cisco equipment listed as design basis)
 - e. Furnish and Install all PA and Sound Intercommunication Systems. Dedicated local sound systems for Auditorium, Gymnasium and Cafeteria shall be in the electrical contract, i.e. not included within the scope of this contract.
 - f. Furnish and Install the Administrative and Staff Telephone System
 - g. Furnish and Install the Streaming TV and Video Distribution Network with Media Retrieval System.
 - h. Provide product demonstrations as required by the Owner

- i. Furnish and Install the Master Clock and Class Period Scheduler and bulletin board system
 - j. Coordination with General Contractor, and all other trades.
3. Technology systems shall be bid as a separate Construction Contract.

It is the intention of the Specifications and Drawings to call for finished work, tested and ready for operation.

Any apparatus, appliance, material, or work not shown on the drawings but mentioned in the specifications, or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered, and installed by the Contractor without additional expenses to the Owner.

Minor details not usually shown or specified, but necessary for proper installation and operation, shall be included in the Contractor's estimate, the same as if herein specified or shown.

With submission of bid, the Contractor shall give written notice to the Architect of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules, and any necessary items or work omitted. In the absence of such written notice, it is mutually agreed that the Contractor has included the cost of all required items in his proposal, and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensation.

NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS, SUPPLEMENTARY INSTRUCTIONS, GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS, SPECIAL CONDITIONS, GENERAL REQUIREMENTS bound in the front of this document are included as a part of the specifications for this work.

DRAWINGS AND SPECIFICATIONS:

These drawings are diagrammatic and indicate the general arrangement of fixtures, equipment, and work included in the contract. Consult the architectural, structural, mechanical and electrical drawings and details for exact location and dimensions of fixtures and equipment; where same are not definitely located, obtain this information from the Architect.

The Contractor shall follow drawings in laying out work and check drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, the Architect shall be notified before proceeding with installation. If directed by the Architect, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

The plans and these specifications are intended to describe, imply and convey the materials and equipment as well as necessary labor, required for the installation as outlined in the paragraph entitled "Scope of Work". Any omissions from either the drawings or these specifications are unintentional, and it shall be the responsibility of the Contractor to call to the attention of the Architect or Engineer any pertinent omissions before submission of a bid. The drawings which accompany these specifications are not intended to show in complete detail every fitting which may be required; however wherever reasonable implied by the nature of the work, any such material or equipment shall be installed by this Contractor as a part of his contract price. In no case will any extra charge be allowed unless authorized in writing by the Architect or Engineer.

The Contractor shall arrange with the General Contractor for required concrete and masonry chases, openings, and sub-bases so as not to delay progress of work. Work shall be installed sufficiently in advance of other construction to conceal piping and to permit work to be built in where required.

WORK SCHEDULE:

The contractor will coordinate all work schedules with the General Contractor and/or Architect. All efforts should be made to complete cable installation prior to the installation of ceiling tile in new or modernized construction.

DEFINITIONS:

It shall be understood and agreed by all parties that where the following terms appear, these definitions apply:

"Furnish" - to supply or give.

"Install" - to place, establish or fix in position.

"Provide" - to furnish and install as defined above.

The term "Bidder" refers to those parties who are submitting proposals for the work set forth in this document.

The term "Contractor" refers to the successful Bidder and to any work or issues after the award of the contract.

The term "Owner" refers to the Bertie County Schools or its designated agent.

GENERAL REFERENCE STANDARDS:

The installation shall comply with the following:

1. NFPA No. 70 National Electric Code (NEC), 2005 Edition
2. State and Local Building codes
3. National Fire Protection Agency (NFPA) No. 101, Life Safety Code, latest Edition
4. UL Directory of Electrical Construction Materials
5. BICSI Telecommunications Distribution Methods Manual

The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings (in addition to contract drawing and documents) in order to comply with all applicable laws, ordinances, rules, and regulations, whether or not shown on drawings and / or specified.

All work and materials under this section shall be in strict compliance with more stringent requirements of the North Carolina State Building Code, including the National Electrical Code, NFPA 101-Life Safety Code, Regulations of the State Fire Marshall, and requirements of the local utility company

STANDARD FOR MATERIALS:

Furnish and install new and undamaged materials conforming to the applicable standard. The standards and publications of the following entities and applicable to materials specified herein:

1. Underwriters Laboratories (UL)
2. Institute of Electrical and Electronic Engineers (IEEE)
3. American National Standards Institute (ANSI)
4. Electronics Industry Association (EIA)
5. Telecommunications Industry Association
6. Electronics Testing Laboratories, Inc. (ETL)

Materials referenced by manufacturer or trade name are cited for the quality of the product and are not intended to limit competitive bidding. The Bidder, at their option, may bid to furnish alternative products which are equal in quality and performance; however, all substitutions must be approved by Owner.

PERMITS AND FEES:

The Contractor shall give all necessary notices, including electric and telephone utilities, obtain all permits, and pay all government taxes, fees, and other costs, including utility connections or extensions in connection with his work file all necessary plans, prepare all documents, and obtain all necessary approvals of all governmental departments having jurisdiction at each phase of construction as required; obtain all required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment for the work.

FCC APPROVAL:

The system shall be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems which are not FCC approved or utilized and intermediary device for connection shall not be considered. Provide the FCC registration number of the system being proposed as a part of the proposal process.

PRODUCT DEMONSTRATIONS:

The Systems Contractor may be required to provide product demonstrations and interviews with the Owner and his representatives or may be required to provide side-by-side demonstrations with other vendors. These demonstrations may be required before a contract is issued. Contractors should be prepared to demonstrate each feature called for in these specifications.

VERIFICATION OF DIMENSIONS, DETAILS, EXISTING FIELD CONDITIONS:

The Contractor shall visit the premises prior to bidding. and thoroughly familiarize himself with all details of the work, working conditions, verify dimensions in the field, provide advice of any discrepancy, and submit shop drawings of any changes he proposes to make in quadruplicate for approval before starting any work. The Contractor shall install all equipment in a manner to avoid building interference.

ACCEPTABLE MANUFACTURERS:

Acceptable manufacturers, as specified in the Contract Documents, implies that the specified manufacturer may produce acceptable products equal in quality of materials and performance to such item specified. The Contractor will be required to provide products meeting, or exceeding the "Standard of Quality and

Performance" as dictated by the product selection noted. However, any changes which result (from substitution of other manufacturers) in the electrical work or work of other Contractors shall be paid for by the Contractor.

Acceptable manufacturer for data equipment, including switches and routers shall be CISCO, HP, 3COM and others meeting the performance specifications of the basis of design, final evaluation shall be made by the engineer.

Basis of Design, Equipment List:

ICS Network Equipment

Quantities as required for complete connectivity of all ports as indicated on plan drawings.

Minimum product requirements shall provide all functions and product performance equal to or in excess of those listed for design basis equipment listed below. Where performance on functional characteristics are in conflict between the equipment list and requirements elsewhere in these specifications, the performance function of the listed equipment shall apply.

<u>ITEM</u>	<u>PART NUMBER</u>	<u>MANUFACTURER</u>
MDF		
3725 Router	CISCO3725	Cisco
3725 LP/IPX plus IOS	S372BP-12301	Cisco
3725 32 to 64 Flash Upgrade	MEM3725-32U64CF	Cisco
3725 128 to 192 RAM Upgrade	MEM3725-128U192D	Cisco
3725 Single T1	VWIC-1MFT-T1	Cisco
3550 – 24 Pwr	WS-C3550-24PWR-EMI	Cisco
4503 Chassis	WS-C4503	Cisco
4500 1300W Power Supply		Cisco
4500 Sup II+	WS-X4013+	Cisco
4500 6 Port GBIC	WS-X4306-GB	Cisco
4500 24 Port 10/100/1000	WS-X4424-GB-RJ45	Cisco
GBIC – SX (722ft)	WS-G5484	Cisco
AP Controller	WLC-5508	Cisco
<u>Switches with Gigabit Ethernet Bandwidth</u>		
Catalyst 3560 48 10/1000 + 4SFP IPB		Cisco
Minimum Layer 3, Multicast		

Catalyst 2960 48 10/100 + 2 1000BT LAN

Access points shall be compatible with Cisco WLC-5508 access point controller.

This list represents a minimum requirement bid. Equipment devices, materials, and labor as required for a complete and operational system shall be included at no additional cost to the Owner. Devices, accessories, and components akin to equipment or required for complete systems shall be of the same manufacturer as those components specified. Data switches provided shall have capacity of 20% spare ports, the technology contractor shall be responsible for all final counts to provide spare capacity.

Equipment listed above as design basis only. This is not a complete list of all equipment and devices required for a complete and operational system. The technology contractor shall provide all equipment of one manufacturer where possible. Approved equal equipment is Hewlett Packard (HP), CISCO, 3COMM, other equipment meeting these specifications as approved by the engineer.

Telephone Equipment

Alternate materials for telephone systems shall include AVAYA IP Office Communication Manager Latest Release, with telephony components, data networking capability and WAN interface as shall meet minimum functionality required within these specifications. Telephones and handsets shall be AVAYA products for VoIP applications.

Provide telephones for classrooms, resource and teacher workrooms shall be AVAYA 7208, quantity as required for one device at each outlet location as indicated on plans.

Provide telephones in the Administration Area, Media center (including ancillary rooms) shall be AVAYA 4621, quantity as required for one device at each outlet location as indicated on plans.

Provide one AVAYA 4630 telephone at Administration Area secretary location.

SHOP DRAWINGS:

The Contractor shall submit a minimum of five (5) copies of the shop drawings to the Architect for approval within thirty (30) days after the award of the general contract. If such a schedule cannot be met, the Contractor may request in writing for an extension of time to the Architect. If the Contractor does not submit shop drawings in the prescribed time, the Architect has the right to select the equipment.

Provide manufacturer's cuts of items to be provided under this Contract. The shop drawings shall be neatly bound in five (5) sets and submitted to the Architect with a letter of transmittal. The letter of transmittal shall list each item submitted along with the manufacturer's name.

Approval rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the contract drawings and specifications.

SUBMITTALS:

A. Prior to proceeding with the work:

A complete schedule of ALL equipment and materials which are to be furnished for the work. Accompanying the schedule shall be manufacturer's specification or cut sheets for all major components listed in Section 2 of this specification.

1. Shop Drawings

Complete shop drawings for all systems and assemblies specified. Each drawing shall have a descriptive title and all subparts of each drawing shall be labeled. All drawings shall have the name and location of the project and the Systems Contractor's name in the title block.

2. Cabinets & Assemblies

Complete scaled drawings of all equipment racks, consoles, special assemblies, etc. Each drawing shall show all equipment with its manufacturer and model number.

3. Device Locations

Complete scaled drawings detailing installation locations of all equipment, such as control panels, plug panels, TV monitors, equipment racks, speakers, etc. All conduits with cable quantities and types and all terminal block locations shall also be indicated.

4. Device Layout

Complete scaled drawings detailing all device plates, plug panels, input/output panels, rack panels and custom components to be fabricated by the Systems Contractor. Include the same details for all custom or non-standard components to be furnished by vendor/manufacturers of the Systems Contractor. Show all connectors, mounting devices and engraving detail on these drawings.

5. System Diagrams

Detailed one line drawing of all systems. Each system drawing shall detail the field wiring and wiring within racks, consoles, control panels, devices, speaker assemblies, etc. Each drawing shall show proposed (and eventually as built) circuit numbers for all cables and terminal connections. Provide typical wiring termination details for all devices.

6. Systems Contractor job references and key employee résumés, as described in the Contractor Qualifications portion of this specification.

C. Prior to proceeding with respective portions of work:

1. Art work drawings, and listings indicating proposed nameplate nomenclature and arrangements for control panels, plug panels, and nameplates prior to fabrication.
2. Front panel layouts for all equipment racks, prior to installation, reflecting equipment to be used.
3. Diagrams for AC power low voltage control switching.
4. Details and descriptions of any other aspect of the system which differ from the contract drawings due to field conditions or due to the equipment furnished.
5. Submittal as otherwise noted on the drawings and/or as noted herein.
6. A list of test equipment, giving makes models and serial numbers for all equipment to be used for testing, and alignment of systems shall be submitted to the Architect prior to the award of the contract. Include certification of Ownership and familiarity with the operation of the following minimum test equipment:
 - a. Low distortion sine wave oscillator
 - b. Distortion analyzer
 - c. AC impedance bridge
 - d. Oscilloscope
 - e. Sound level meter and octave band filter set
 - f. Multimeter with true RMS-AC measurement capability

- g. Random pink noise generator
 - h. Loudspeaker polarity indicator
 - i. Time Delay Reflectometer (TDR)
 - j. RF Field Strength Meter
 - k. LAN cable meter with NEXT and attenuation functions
 - l. Optical power loss meter, with light source
 - m. Optical Time Delay Reflectometer (OTDR)
 - n. 1/3 Octave band real time audio spectrum analyzer
- 7. Approved shop drawings and instruction brochures, including schematic diagrams for all electronic devices, shall be present at the job site during the period set aside for system testing.
 - 8. Notebooks of operating instructions shall be prepared for the Owner as described herein.

C. At Project Completion

1. As-Builts

Prior to final acceptance, provide three complete sets of drawings showing all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions.

2. Operation and Maintenance Manuals

Prior to final acceptance, provide three complete sets of operation and maintenance manuals for the system. The operation manual shall contain all instruction necessary for the proper operation of the installed system and manufacturers' instruction. The maintenance manual shall contain all "proof of performance" information as required in Section 3, and all manufacturers' maintenance information, and copies of non-priority computer programs and system set up disks documenting all programmable features for the installed system.

COORDINATION WITH OTHER TRADES:

Coordinate all work required under this section with work of other sections of the specifications to avoid interference. Bidders are cautioned to check their equipment against space available as indicated on drawings, and shall make sure that proposed equipment can be accommodated. If interferences occur, Contractor shall bring them to attention in writing, prior to signing of contract; or, Contractor shall at his own expense provide proper materials, equipment, and labor to correct any damage due to defects in his work caused by such interference.

INSPECTION AND CERTIFICATES:

On the completion of the entire installation, the approval of the Architect and Owner shall be secured, covering the installation throughout. The Contractor shall obtain and pay for Certificate of

Approval from the public authorities having jurisdiction. A final inspection certificate shall be submitted to the Architect prior to final payment. Any and all costs incurred for fees shall be paid by the Contractor.

EQUIVALENTS:

When material or equipment is mentioned by name, it shall form the basis of the Contract. When approved by the Architect in writing, other material and equipment may be used in place of those specified, but written application for such substitutions shall be made to the Architect as described in the Bidding Documents. The difference in cost of substitute material or equipment shall be given when making such request. Approval of substitute is, of course, contingent on same meeting specified requirements and being of such design and dimensions as to comply with space requirements.

CUTTING AND PATCHING:

On new work, the Contractor shall furnish sketches to the General Contractor showing the locations and sizes of all openings and chases, and furnish and locate all sleeves and inserts required for the installation of the electrical work before the walls, floors, and roof are built. This Contractor shall be responsible for the cost of cutting and patching where any items were not installed or where incorrectly sized or located. See also Section 01050.

CONTRACTOR QUALIFICATIONS:

- A. The Contractor or subcontractor must be a "Systems Contractor" who has been regularly engaged in the furnishing and installation of commercial and industrial sound, communications and telephone systems and related visual communications systems for a period of at least the last three (3) years and who can show evidence of successfully completing, with its present staff, at least three (3) projects of similar size and scope, including the media management addition. The Systems Contractor, not its employees, must meet these contractor qualifications. With the proposal, provide a list of jobs completed, with contact, address and phone number and the A/V Contractors key employees assigned to the project, listing their responsibilities during the job and the length of time with the contractor in this capacity.
- B. The Systems Contractor shall demonstrate to the satisfaction of the Architect/Engineer and Owner that it has:
 1. Adequate plant and equipment to pursue the work properly and expeditiously.
 2. Adequate staff and technical experience to implement the work.
 3. Suitable financial status to meet the obligations of the work.
 4. Technically capable and factory trained service personnel at a contractor owned service facility within one hundred (100) mile radius of the project site, to provide routine and emergency service for all products used in the project.
- C. The Systems Contractor shall:
 1. Be bondable.
 2. Hold a SPLV Contractors License which is accepted as valid within the State of North Carolina.

3. Be a factory authorized sales and installation contractor for all products used in the project.
- D. Any contractor, who intends to submit a proposal for this work and does not meet the requirements of the "Contractor Qualifications" paragraph(s) above, shall employ the services of a "Systems Contractor" who does meet the requirements and who shall furnish the equipment, shop fabricate the equipment racks and subassemblies, make all connections to equipment and equipment racks, make all connections to remote controls and connection panels, and continuously supervise the installation and connections of all system cable and equipment.
- E. A subcontractor so employed as the "Systems Contractor" shall be acceptable to the Owner and/or Architect/Engineer and shall be identified in the proposal.

QUALITY ASSURANCE:

A. General

All equipment and materials required for installation under these specifications shall be new (less than 1 year from date of manufacture) and without blemish or defect.

B. Specific

Each major component of equipment shall have the manufacturer's name, address and model number on a plate securely affixed in a conspicuous place. NEMA code ratings, UL label, or other data which is die-stamped into the surface of the equipment shall be easily visible.

C. Substitutions

It is not the intent of these specifications to limit or restrict submission of proposals for products by other manufacturers but to set a baseline of operational performance and functions which all bidders must meet.

- D. Where a specific piece of equipment has been discontinued and/or replaced by a new model, submission of the new model does not guarantee acceptance. Substitute items shall require evaluation by the Architect/Engineer, Owner or their agent prior to acceptance.
- E. If substitute equipment is allowed even by an approved submittal, the ITS Contractor shall be completely responsible for its use and for its ability to fulfill all intended functions in the completed systems. The ITS Contractor shall replace all such equipment with equipment listed by type and model number in the specifications if there is any evidence of equipment instability and/or incompatibility.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

A.

B. GENERAL DESCRIPTION – SCOPE OF WORK

Provide a complete integrated telephone, intercom and media retrieval Communication System. The system shall incorporate integrated speaker intercom, telecommunication system, integrated clock systems and IP based media retrieval system. **The system manufacturer's representative shall maintain a service office within a radius of 75 miles from job site.**

SCOPE OF WORK

The base bid for this contract shall include handsets for the telephone system.

Basic Scope

- Any combination of administrative display phones, administrative VoIP phones, administrative phones, call buttons, speakers, or Telemedia media control in the office areas, workrooms, staff areas, and classrooms
- Programming and audio distribution setup via the LAN
- Any or all of the ports can be setup as an administrative port

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. The conditions of the General Contract (General, Supplementary, and other Conditions) and the General Requirements are hereby made a part of this Section.
- B. Basis of design is Bogen Quantum Multicom IP, equal products by Valcom, Rauland and other manufacturers as approved by the engineer shall be accepted.. The catalog numbers and model designations are that of the Quantum Multicom IP (or equal), these are provided for reference only to designate the type and function of system components, other equal manufacturers shall be accepted as noted above. The specifying authority must approve any alternate system.
- C. The contractor shall provide the FCC registration number of the proposed system.
- D. Final approval of the alternate system shall be determined at the time of job completion. Failure to provide the "precise functional equivalent" shall result in the removal of the alternate system at the contractor's expense.
- E. The contractor for this work shall be held to have read all of the bidding requirements, the general requirements of division 1, and contract proposal forms, and the execution of this work. The contractor will be bound by all of the conditions and requirements therein.
- F. The contractor shall be responsible for providing a complete functional system including all necessary components whether included in this specification or not.
- G. In preparing the bid, the contractor should consider that no claim will be made against the owner for any costs incurred by the contractor for any equipment demonstrations which the owner requests.

1.02 SCOPE OF WORK

- A. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating school communications system including but not limited to:
 - 1. Administrative display phone with integrated 4x16 character display
 - 2. Administrative VoIP Phone
 - 3. Classroom speaker(s), ceiling- or wall-mounted
 - 4. Built in Master Clock with 1024 events, 32 Schedules, including Daylight Savings Time, and 32 custom holiday events that can be assigned to any of the 64 multi-purpose zones
 - 5. Wall-mounted paging horns
 - 6. One built-in network interface port for system combining and LAN station-to-station calling and district-wide all-calls
 - 7. One built-in network interface port for first-time system configuration
 - 8. Built-in Web Server for full system programming with Quantum Commander
 - 9. Administrative Web-Browser Application for Programming and System Operation
- B. System can connect to the PSTN (Public Switched Telephone Network) by connecting it to analog CO trunks.
 - 1. Telephone service with public utilities shall be arranged by the owner, in conjunction with the equipment supplier. Equipment supplier shall generate a one-page document that will provide the Owner with information concerning number of outside lines (minimum of 8, and a maximum of 960 per school, max of 99 Schools [facilities]).

1.03 SUBMITTALS

- A. Specification Sheets shall be submitted on all items including cable types.
- B. Submit outline drawing of system control cabinet showing relative position of all major components.
- C. Shop drawings, detailing integrated electronic communications network system including, but not limited to, the following:
 - 1. Station wiring arrangement
 - 2. Equipment cabinet detail drawing
- D. Submit wiring diagrams showing typical connections for all equipment.
- E. Submit a numbered Certificate of Completion for installation, programming, and service training, which identifies the installing technician(s) as having successfully completed the technical training course(s) provided by the system manufacturer.

1.04 QUALITY ASSURANCE

- A. All items of equipment shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.
- B. The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least 5 years. The contractor shall be a duly authorized distributor of the equipment supplied with full manufacturer's warranty privileges.
- C. The contractor shall show satisfactory evidence, upon request, that he or she maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The contractor shall maintain at his or her facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

1.05 SINGLE SOURCE RESPONSIBILITY

- A. Except where specifically noted otherwise, all equipment supplied shall be the standard product of a single manufacturer of known reputation and minimum of 15 years experience in the industry. The supplying contractor shall have attended the manufacturer's installation and service school. A certificate of this training shall be provided with the contractor's submittal.

1.06 SAFETY / COMPLIANCE TESTING

- A. The communications system shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as ETL, and be listed by their re-examination service. All work must be completed in strict accordance with all applicable electrical codes, under direction of a qualified and factory approved distributor, to the approval of the owner.
- B. The system is to be designed and configured for maximum ease of service and repair. All major components of the system shall be designed as a standard component of one type of card cage. All internal connections of the system shall be with factory-keyed plugs designed for fault-free connection.
- C. The printed circuit card of the card cage shall be silk-screened to indicate the location of each connection.

1.07 IN-SERVICE TRAINING

- A. The contractor shall provide a minimum of eight hours of in-service training with this system. These sessions shall be broken into segments, which will facilitate the training of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.

1.08 WIRING

- A. System wiring and equipment installation shall be in accordance with good engineering practices as established by the EIA and the NEC. Wiring shall meet all state and local electrical codes. All wiring shall test free from all grounds and shorts.
- B. All communication system wiring shall be labeled at both ends of the cable. All labeling shall be based on the room numbers as indicated in the architectural graphics package.

1.09 PROTECTION

- A. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

- B. The contractor shall note in his system drawings, the type and location of these protection devices as well as all wiring information. Such devices are not to be installed above the ceiling.

1.10 SERVICE AND MAINTENANCE

- A. The contractor shall provide a **five year equipment warranty** of the installed system against defects in material and workmanship. All materials shall be provided at no expense to the owner during normal working hours. The warranty period shall begin on the date of acceptance by the owner/engineer.
- B. The contractor shall, at the owner's request, make available a service contract offering continuing factory authorized service of this system after the initial warranty period.
- C. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

PART 2 - EQUIPMENT SPECIFICATION

2.01 MANUFACTURERS

- A. Manufactures: Subject to compliance with requirements specifications, provide the following system:
 - 1. Quantum Multicom IP manufactured by Bogen Communications, Inc., Ramsey, NJ (or equal)
- B. The Specifying authority must approve any alternate system.
- C. The intent is to establish a standard of quality, function and features. It is the responsibility of the bidder to insure that the proposed product meets or exceeds every standard set forth in these specifications.
- D. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

2.02 EQUIPMENT

A. CONSOLE

- 1. Rack-mounted equipment shall be Installed in appropriate sized 77" rack.
- 2. MCRMP / MCMP / QRC24-48 (Compact Rack System)

Rack Mount full, Mini-System, or Wall Mount panel. Shall include the following components:

- Quantum Processor Card QSPC1
- Analog Card
- Station Card
- Telephone Interface Card
- 5 volt / 12 volt Power Supply
- 26 volt Power Supply(s)
- Audio Program Module Interface Assembly

- 3. MCRMF / MCMF / QRC24-48

- a. MCRMF Rack mounting mainframe. Includes built-in ventilation fans and the following circuit cards:
 - Quantum Processor Card
 - Analog Card
 - Station Card
 - Telephone Interface Card
 - Ribbon Cable Assembly
- b. MCMF Wall Mount mounting mainframe. Utilizes convection cooling and the following circuit cards:
 - Quantum Processor Card
 - Analog Card
 - Station Card
 - Telephone Interface Card
- c. QRC24 / QCR48 Compact Quantum Rack System Mainframe (1 per Mini-System). Includes built-in ventilation fan and the following circuit cards:
 - Quantum Processor Card
 - Analog Card
 - Station Card
 - Telephone Interface Card
- 4. MCRRP / MCRRC / MCRC
 - 1. Relay Module/Card
- 5. MCRCA
 - a. Ribbon Cable Assemblies
- 6. Program Sources
 - a. CD Player & AM/FM Tuner
- 7. Power Amplifiers
 - a. 125-Watt Amplifier
- 8. Station Equipment
 - a. Administrative Display Phone
- 9. Optional Equipment
 - a. None Provided

2.03 COMPONENTS AND DESCRIPTIONS

- A. The VoIP capabilities of the QSPC1 Quantum Processor Card will enable the support of the features across the various processors' nodes. The sections below cover how the system will handle each of the existing and the new features in the QSPC1 product. Systems that do not allow the reuse of existing equipment or are not backwards compatible shall not be deemed acceptable.

Systems that don't allow processors to be seamlessly integrated via the LAN are not considered equal.

B. Quantum Multicom IP (or equal)

1. The Quantum facility shall have a minimum of one node/processor and a maximum of 64 interconnected nodes/processors. A maximum of 99 facilities can be interconnected into a district.
2. The station numbers, program buses, etc. shall be identified with a QSPC1#, Station card# and port# or QSPC1#, program#.
3. Audio Information will be transmitted between the processors on the LAN using VoIP technology. Quantum will utilize all of the existing Multicom 2000 hardware except the current processor card. Thus making Quantum Multicom IP backwards-compatible with existing Multicom 2000 systems.
4. The processor software shall be upgradeable via Quantum Commander. The Quantum automatically reboots after it installs the software upgrade. If for some reason the newly installed software will not boot properly, the system shall revert to the previous working load.
5. It shall be possible for Quantum schools to exchange 'station-to-station' calls and 'inter-facility All-Call paging' to a single facility or all facilities in a district using VoIP technology.
6. The primary QSPC1 shall be configured to act as a Gateway for facility point-to-point calls. Using Quantum Commander, every facility shall be configured with the IP addresses of the primary QSPC1 systems of all the other known facilities (maximum of 98 additional), and an organizationally private multicast IP address (i.e. 239.x.y.z series), which shall be used for inter-facility paging.
7. The maximum number of simultaneous inter-facility point-to-point calls supported is based on the actual performance of the network and the CPU load. The voice quality of the inter-facility calls may vary based on the network conditions.
8. The system shall facilitate the playing of short audio clips repetitively played until stopped by the Quantum Commander User or administrative display phone MCDS4 whichever occurs earlier.
9. A built-in Master Program Clock, with battery backup, shall be included to automatically control class change or other signals. The Master Program Clock shall have 1024 events that may be programmed into any of the 32 time signaling schedules, and/or 32 flexible holiday schedules. Systems that rely on external master clock shall not be considered equivalent.
10. Network Time Synchronization. The system shall be capable of periodic update/synchronization of the processor's time with a Network Time Server via the school's LAN network. Systems that do not provide Network Time Synchronization will not be deemed equivalent.

C. Quantum Commander

1. The processor utilizes a web-based programming tool. The Quantum Commander is built into the QSPC1 processor card and upon boot up, users can login to the Quantum Commander Web Server via their web browser.
2. The Quantum Commander shall be broken into three access levels depending on user access credentials. Systems that do not provide at least three (3) levels of access are not equal.

3. Only the Administrator and Technician shall have access to add/delete/modify the database objects.
4. Users shall have display only access to see the data objects that include configuration, alarms, and performance data and perform certain operations based on the user's CoS (Class of Service).

D. Administrative Display Phone

1. Administrative Display Phones shall be Bogen Model MCDS4 (or equal). The administrative telephone display panel shows the time of day and day of week, the current time signaling schedule, and the station numbers and call-in priority of staff stations that have called that particular station. A 3-key response is used to scroll the display, and answer or erase normal, urgent, and security calls. Depending upon the system programming, an administrative station can use display menus to activate zone pages, alarm signals and external functions, as well as select program sources and distribute or cancel a program to any or all speakers or zones.
2. Administrative Display Phones shall have the ability to dial and have the option of dialing either the loudspeaker or phone at each station location. The system shall automatically switch from phone-to-intercom communication to phone-to-phone communication when the staff handset or enhanced staff phone on the receiving end of the call is lifted.
1. The Administrative Display Phone shall display the classroom number of any station that calls 911. This feature will notify the main office when a classroom has dialed 911 emergency centers so that administrators can direct emergency personnel to the correct physical location in the building when they arrive. Systems that do not provide this feature will not be deemed equal.
2. The Administrative Wall Display shall display the classroom number of any station that calls 911. This feature will notify the main office when a classroom has dialed the 911 emergency centers so that administrators can direct emergency personnel to the correct physical location in the building when they arrive. Systems that do not provide this feature will not be deemed equal.

E. Administrative Phone

1. Classroom phones (where required) shall be one of the following Bogen Model(s)
 - a. MCDS4 – Administrative Display Phone
 - b. QSIP1 – Administrative VoIP Phone (Desk or Wall)
 - c. MCESS – Administrative Desk Phone
 - d. MCWESS – Administrative Wall Phone.
2. The Station goes Off-Hook and dials the 3- to 6-digit (preceded by an * if calling a telephone instead of loudspeaker) number of the desired station. The call is routed to any station (admin/staff).The classroom phone shall be capable of the following features:
 - a. Emergency Call involves going off hook and flash hook the switch at least four times. The Call is then switched to the assigned Admin Phone. This requires the display of the architectural number on the Administrative Display phone and or Wall Display. Systems that do not provide this feature are not equivalent.
 - b. Alarm Distribution
 - c. Audio Program toggle On/Off
 - d. Call Forward activation for All-Calls/Busy/No Answer/Busy or No Answer

- e. Cancel Call Forward
- f. Conference Calling
- g. Transfer Call
- h. Dial administrative display phone, dial the station number to call to the speaker or dial the station number preceded with * to call the phone. The call shall be routed to the administrative display phone and/or administrative wall display showing the architectural number that is calling.
- i. Emergency All-Call shall be broadcasted to all the stations in the facility.
- j. Place Outside Call
- k. Remote Answer
- l. Single-Zone/All-Station Page
- m. Call Waiting Tone for Outside Calls, and it shall be possible to feed the call waiting tone to the Administrative Phone during a conversation.

F. VoIP Display Phone (where required)

1. The Station goes Off-Hook and dials the 3- to 6-digit (preceded by an * if calling a telephone instead of loudspeaker) number of the desired station. The call is routed to any station (admin/staff). The classroom VoIP Display phone shall be capable of the following features:
 - a. Speed dials
 - b. Missed call logging
 - c. Ethernet pass through jack
 - d. Alarm Distribution
 - e. Audio Program On/Off
 - f. Call Forward activation for All-Calls/Busy/No Answer/Busy or No Answer
 - g. Cancel Call Forward
 - h. Dial administrative phone, dial the station number to call to the speaker or dial the station number preceded with * to call the phone. The call shall be routed to the administrative display phone and/or administrative wall display showing the architectural number that is calling.
 - i. Emergency All-Call shall be broadcasted to all the stations in the facility.
 - j. Place Outside Call
 - k. Single-Zone/All-Station Page

G. Classroom Call Staff Stations (where required)

- a. Staff Stations shall be Bogen Model (or equal):
 1. CA21B – Call Switch with Privacy
 2. CA15C – Call Switch
 3. HS201C-202C – Handset
 - b. Shall be capable of Normal/Urgent/Emergency Calls
 - c. Normal/Urgent Call involves pressing the Call Switch once or lifting the Telephone Handset. The Call is then switched to the Administrative Display Phone. This requires the display of the architectural number on the Administrative Display Phone and/or Wall Display.
 - d. Emergency Call involves pressing the emergency call switch; flash hook the switch at least 4 times in a non-dial analog handset with Call Level Normal or Urgent; pressing the call switch or hook switch one time in a non-dial analog handset with Call Level Emergency only. The Call is then switched to the Administrative Display Phone. This requires the display of the architectural number on the Administrative Display Phone and/or Wall Display.
 - e. Emergency Link Transfer - If the emergency call is unanswered by the Administrative Display Phone and the emergency link transfer is provisioned and programmed; the emergency call will be forwarded to the loudspeaker associated with that station. Any station/admin phone with speaker can be programmed for the Emergency Link Transfer except the Administrative VoIP Phone. Systems that do not provide Emergency Link Transfer will not be considered equal.
- H. Intercom System Speakers
1. Classroom Speakers shall be Bogen(or equal):
 - a. Ceiling Speakers: CSD2X2 Drop-In Ceiling Speakers
 - b. Wall Speakers: MB8TSQ/SL Metal Box Speakers
 2. Hallway Speakers shall be Bogen: (or equal)
 - a. Ceiling Speakers: CSD2X2 Drop-In Ceiling Speakers
 - b. Wall Speakers: MB8TSQ/SL Metal Box Speakers
 3. Outdoor / Gym / Locker Room Speakers shall be Bogen(or equal):
 - a. FMH15T mounted in BBSM6 surface-mounted vandal-resistant enclosure/BBFM6 flush-mounted vandal-resistant enclosure with FMHAR8 adapter ring and SGHD8 heavy duty grille
 - b. KFLDS30T Wide Dispersion Reentrant Horn Loudspeakers
 4. Common Area Speakers shall be Bogen: (or equal)
 - a. HFCS1 High-Fidelity Ceiling Speakers
 - b. OCS1 NEAR Orbit Ceiling Speakers
 - c. OPS1 NEAR Orbit Pendent Speakers
- I. Quantum Commander
1. The processor utilizes a web-based programming tool. The Quantum Commander is built into the QSPC1 processor card, and upon boot up, user can login to the Quantum Commander Web Server.

2. The Quantum Commander shall be broken into three access levels depending on user access credentials. Systems that do not provide at least three (3) Levels of access are not equivalent. The three levels are:
 - a. User
 - b. Administrator
 - c. Technician
3. Only the Administrator and Technician shall have access to add/delete/modify the database objects.
4. Users shall have display only access to see the data objects that include configuration, alarms, and performance data and perform certain operations based on the user's CoS (Class of Service).
5. The following Menu Items must be available on the Multicom IP Quantum Commander:
 - a. File - Open Database, New System, Save, Delete, Report and Exit, Upload Database, Download Database, Download Software, Diagnostics, Tones and Announcements, Relay Configuration, Program Distribution, Media Assignment, List Passwords, Add Password, and Change Password.

2.04 SYSTEM PARAMETERS

- A. The communication system shall be a Bogen Quantum Multicom IP(or equal), and shall provide a comprehensive communication network between administrative areas and staff locations throughout the facility. Nonvolatile memory shall store permanent memory and field-programmable memory. A system, which uses a battery to maintain system configuration information, shall not be acceptable.

The system shall provide no less than the following features and functions:

1. Telephonic communication (complete with DTMF signaling, dial tone, ringing and busy signals, and data display) on administrative stations shall use two wires. Systems that use more than two wires for communication, tones and data display shall not be acceptable.
2. Amplified-voice communication with loudspeakers shall use a shielded audio pair (shield can be used as one of the two required conductors for administrative phone or call-in switch).
3. The system shall be available in the following configurations:
 - a. MC2K Wall-mounted in a custom enclosure Quantum. Station capacity shall be from 24 to 130 stations each Node. All stations shall have the ability to support displays.
 - b. MC2KR Rack-mounted Quantum. Station capacity shall be from 24 to 250 stations each Node. All telephone stations shall have the ability to support displays.
 - c. QRC24 & QRC48 Compact Quantum Rack System. Station capacity shall be from 24 to 48 stations per node. All stations shall have the ability to support displays, with an option to add up to 8 Central Office phone lines.
 - d. 2223/2233 MC2KR Rack-mounted and integrated with Bogen Multi-Graphic Series 2223 or Series 2233 equipment. In this configuration, Quantum Multicom IP system station capacity shall be expandable up to 240 stations in increments of 24 per node. All telephone stations shall have the ability to support displays. The Multi-Graphic system equipment provides the following: backup fail safe intercom and paging functions (Note: the systems operate independently; if one were to fail, the other provides intercom for student safety),

plus two additional program channels, and additional Multi-Graphic functions. It shall be possible, by use of a separate call-in switch, to annunciate only to the Multi-Graphic portion of the system without using additional station ports within the Quantum Multicom IP system. For switch banks to work effectively the equipment must be centrally located for switch-bank operation.

The above system configurations represent a single processor in the Quantum Multicom IP. Each processor can be combined with up to 63 additional systems (nodes) for a total single facility capacity of up to 16,000 stations.

4. The system shall consist of any combination of the following: Administrative Display Phones, Administrative VoIP Phones, and Administrative Phones.
 - a. Staff Classroom Stations shall consist of wall- or ceiling-mounted loudspeakers with call-in switches or handsets.
 - b. Administrative phone stations shall consist of VoIP phones, display phones, or DTMF dialing 2500 analog-style telephone sets.
 - c. Administrative Display Phones shall be DTMF-dialing digital telephone sets with a 4x16 character LCD display panel. They shall be equipped with a standard 12-key push-button dialing keypad. Phones requiring external LCD displays shall not be accepted as an equal. Optionally, a loudspeaker may be connected at each administrative station location.
 1. Up to 5 Administrative Wall Displays may be added to the Administrative Station for large office areas.
 - d. Administrative Display Phones, Administrative VoIP Phones, and Administrative Phones shall have the option of including a loudspeaker.
 - e. All types of stations except administrative VoIP phones shall utilize the same type of field wiring. Future station alterations shall only require the station type to be changed and the proper software designation to be selected. Alterations shall not require field wiring or system head-end alterations. All field wiring and system head-end equipment shall support any type of station, at the time of installation. All contractor proposals shall reflect this capacity. Failure to submit and bid this project in this manner will be deemed as being in direct conflict of these specifications and will be rejected.
 - f. There shall be no limit to the number of administrative display stations within the total capacity of the system.
 - g. It shall be possible at any time to change the type of station at any location without equipment or wiring changes except for administrative VoIP phones that utilize existing LAN connections. Systems that limit the quantity of each station type or require future additional equipment and/or system expansion to provide additional administrative telephones shall not be accepted as an equal.
5. The system shall be a global switching system, providing up to 512 unrestricted simultaneous private telephone paths per facility. The system shall also be capable of providing up to 512 amplified intercom paths per facility. One amplified intercom path shall automatically be provided with each increment of 24 stations of system capacity. All hardware, etc., required to achieve the necessary number of amplified-voice intercom channels for this system shall be included in this submittal. Amplified-voice intercom channels shall provide voice-activated switching. Systems requiring the use of a push-to-talk switch on administrative telephones shall not be acceptable. There shall be an automatic level control for return speech during amplified-voice communications. The intercom amplifier shall also provide control over the switch sensitivity and delay times of the VOX circuitry.

6. The system shall provide 911 Dial-Through with specific outside line(s) dedicated only for this function to ensure that the line is available all the time for 911 calls. The 911 Dial-Through is available to any station that can dial.
 - a. The 911 CO lines will be pre-configured and reserved. If the 911 reserved lines are busy, the normal CO lines will be connected to route the 911 calls. If all the normal CO lines are busy, the ongoing call shall be disconnected and the 911 call shall be placed.
 - b. When 911 is dialed from a Administrative VoIP Phone or Administrative Phone its Administrative Display Phone or Wall Display will receive a message that that room dialed 911.
7. It is of utmost importance that emergency calls from staff stations receive prompt attention. Therefore, it is important that there be an alternate destination in case the emergency call does not get answered at the primary location. To this end:
 - a. Staff-generated Emergency calls shall be treated as the second highest system priority. Therefore, all Emergency calls shall announce at the top of the call queue of their respective administrative display phone. Should that emergency call go unanswered for 15 seconds, the call shall be re-routed to an alternate speaker station then a tone prompts the caller to make a verbal call for help. During the transfer, the original administrative telephone shall continue to ring the distinctive Emergency Ring. Should the Emergency Transfer to Station have an associated administrative telephone, it too shall ring the distinctive Emergency ring.
 - b. The Emergency Transfer to Station shall be field programmable.
 - c. Should the original administrative display phone be engaged in a non-emergency conversation, its conversation shall be automatically terminated, indicated with an alert tone, and then reconnected to the station that generated the Emergency Call.
 - d. Should the administrative display phone be engaged in an emergency conversation, successive emergency calls shall log into the call queue as well as transfer to the Emergency Transfer Station for their verbal call for help. Upon termination of the initial emergency conversation, the next one shall immediately ring the administrative telephone.
 - e. Systems failing to transfer unanswered Emergency calls or failing to immediately connect to the administrative display phone shall not be deemed as equal.
8. There shall be a System-Wide Facility Emergency All-Call feature. The Emergency All-Call shall be accessed from designated administrative phones or by the activation of an external contact closure which shall give the third audio program input emergency status. The Emergency All-Call function shall have the highest system priority and shall override all other loudspeaker-related functions including Time Tones, Normal All-Call or Zone Pages or Audio Distribution.
 - a. Considering that emergencies calls are to be treated with the highest level of concern. Systems which do not regard Emergency-All-Call page from an administrative station with the highest priority shall not be deemed as equal.
 - b. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access emergency functions.

- c. The Emergency All-Call shall capture complete system priority, and shall be transmitted over all speakers in the facility. It shall also activate an external relay, which can be used to automatically override volume controls and other systems.
 - d. Systems without Emergency All-Call, or systems with All-Call that cannot be activated by external means, or which do not capture complete system priority or activate an external relay, shall not be acceptable.
 9. There shall be at least four Dedicated Emergency Alarm Tones. Each may be accessed by dialing a three-digit number from designated administrative display phone. These emergency tones should be separate from the time tones. Systems using external alarm generators, or having less than four emergency alarm tones shall not be acceptable.
 - a. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access Emergency Alarm Tones.
 10. There shall be four (4) External-Function Relay Driver Outputs, accessible from designated Quantum Commander User or Administrative Display Telephones by dialing a four-digit number. These outputs remain set until accessed and reset at a later time. The user shall have the ability to review the status of each relay driver. A plain English menu, prompting the user through the fields without requiring the user to remember any dialing sequences shall support this feature. Systems that require the user to remember complicated dialing schemes or prompt the user via cryptic commands shall not be deemed equal.
 - a. The stations shall be capable of being programmed for security contact relays for use with magnetic locks, motion detectors, cameras or any low-voltage, dry contact creating device. System using security stations for control of external functions shall not be acceptable.
 - b. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access external relay functions.
 11. There shall be a program-material interface included with each node, which shall accept up to four (4) Bogen Power Vector Series program modules. Systems requiring an external program source interface shall not be acceptable.
 12. There shall be an outside line feature. The circuitry shall interface with the station ports of an external telephone system, and shall provide facilities for up to 960 incoming lines per facility which shall be designated by the user to ring "day" and "night" administrative display stations or administrative stations. Where an administrative display station is designated to receive outside line calls, the phone shall ring with a unique tone and the outside line number shall appear on the display panel. The option shall also provide the ability to make outside line calls from Administrative Display Stations or Administrative Stations. This ability shall be programmable for each phone and there shall be thirty-two Classes of Service available to any station. This feature shall be capable of supporting DID, DISA, and a Security DISA function.
 - a. Cellular system access for Security is of the utmost concern. Wireless security page offers a password-protected Security DISA feature that shall be accessible only from authorized Police, Fire, Emergency personal or an off-premise security office, which monitors the facility's security system. It shall function as follows: upon confirmation of the password DISA number, the system shall allow security personnel to dial access any station and monitor the activity without pre-announce tone or the privacy tone. This will then allow the security office to determine exactly what the conditions are in the station and the actions need to be taken.

13. The system shall provide for field-programmable three-, four-, five-, or six-digit architectural station numbers.
14. There shall be an automatic level control for return speech during amplified-voice communications.
15. Each station loudspeaker shall be assignable to any one, any combination, or all of 64 Multi-purpose zones or any of the 16,000 hard-wired zones per facility.
 - a. Each station loudspeaker shall be assignable to any one, any combination, or all of 64 Multi-purpose zones. Systems with less than 64 Multi-purpose zones shall not be acceptable.
16. There shall be thirty-two (32) Flexible Time-Signaling Schedules with a total of 1024 user-programmed events per facility. Each event shall sound one of user-selected tones or external audio. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized Quantum Commander User via Web browser. Systems, which do not provide a minimum of thirty-two (32) flexible time-signaling schedules or a choice of eight (8) time tones plus external audio, shall not be acceptable.
17. An internal program clock (with battery backup) shall be included, allowing a total of 1024 user-programmed events per facility. It shall be possible to synchronize the internal program clock with an external master clock. Systems, which do not provide an internal program clock and/or can not synchronize with an external master clock to meet these specifications, are not equal.
 - a. There shall be thirty-two (32) flexible time-signaling schedules. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized Quantum Commander User via Web browser on the LAN.
 - b. The built-in Master Clock corrects time by accessing the LAN NTP time server.
 - c. The Quantum Processor is capable of adjusting the Daylight Savings Time automatically.
 - d. Each event shall be able to be directed to any one or more of the sixty-four (64) Multi-purpose time-signaling zones.
 - e. Each of the 64 Multi-purpose zones shall have a programmable "tone duration" unique unto itself. For example: the gymnasium shall receive a time tone for ten (10) seconds while the rest of the facility receives a tone for five (5) seconds.
 - f. Each event shall sound one of eight (8) user-selected tones or external audio. Each event may utilize a different custom tone. It shall be utilized to send the gymnasium, shop classes, and pool (if necessary), a separate time tone to indicate "clean up." Minutes later the entire facility can then receive the same time tone to indicate class change.
 - g. Each of the eight (8) Distinct Time Tone Signals may be manually activated by selected Administrative Display Phones or an authorized Quantum Commander User via web-browser. These tone signals shall remain active as long as the telephone remains off-hook, or until canceled from the keypad or Quantum Commander.
 1. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter the next digit. In this way, the user shall not be required to memorize complicated key sequences in order to access manual time-tone functions.
 2. Systems that do not provide at least thirty-two (32) flexible time signaling schedules or do not provide automatic activation of schedules shall not be acceptable.

18. There shall be a zone-page/all-page feature that is accessible by selected administrative VoIP phones and administrative phones.
 - a. There shall be automatic muting of the loudspeaker in the area where a page is originating.
 - b. There shall be a pre-announce tone signal at any loudspeaker selected for voice paging.
19. There shall be a voice-intercom feature that is accessible by selected administrative phones, administrative VoIP phones and all administrative display phones.
 - a. There shall be a periodic privacy tone signal at any loudspeaker selected for amplified-voice communication.
 - b. There shall be a pre-announce tone signal at any loudspeaker selected for voice-intercom communication.
 - c. Privacy and pre-announce tone signals shall be capable of being disabled during system initialization.
 - d. There shall be an automatic switchover to private telephone communication should the person at the loudspeaker pick up his handset.
 - e. By picking up the receiver and dialing the first digit of the number of the station to be called, that number shall appear on the display along with a loudspeaker symbol, prompting the user to enter the next digits. There shall be no confusion as to the type of conversation that is to be established.
20. There shall be a telephonic communication feature, which is accessible by all Administrative VoIP Phones, Administrative Phones, and Administrative Display Phones.
 - a. There shall be an audible ring signal announcing that a call has been placed to that station.
 - b. Upon picking up the receiver and dialing * (star), a telephone symbol shall appear on the display, prompting the user to enter the number of the station to be called. There shall be no confusion as to the type of conversation that is to be established.
 - c. There shall be an automatic disconnect of Staff Handsets left off-hook to prevent them from tying up communications channels. The station shall receive a busy signal and shall automatically disconnect after 45 seconds. Systems shall also be capable of doing off hook emergency call-in.
 - d. There shall be an automatic disconnect of Administrative Display Phones and Administrative Phones to prevent them from tying up communications channels. When a phone goes off-hook and does not initiate a call within ten seconds, the station shall receive a busy signal and shall automatically disconnect after 45 more seconds.
 - e. Staff and Administrative Phone Stations may be programmed to ring an Administrative Display Phone during day hours and another Administrative Display Phone during night hours. Day and Night Hours shall be user-programmable. Assignment of Staff Stations shall not be restricted to any particular Administrative Station. Systems that limit the number and assignment of staff call-in to particular Administrative Display Station of Administrative Stations shall not be acceptable.
21. Each staff call station shall be programmable for one of three call-in types, as follows:

Normal / Emergency

Urgent / Emergency
Emergency

- a. Staff Call Stations programmed for access Normal / Emergency or Urgent / Emergency shall be able to initiate an emergency call by repeated flashing of the hook switch or repeated pressing of the call-in switch. Systems, which require additional switches and/or conductors to initiate an emergency call, shall not be acceptable.
 - b. Emergency Calls from Administrative VoIP Phones, Administrative Phones or Staff Call Switch Stations shall interrupt a non-emergency call in progress at the designated Administrative Display Phone. The administrator shall receive a warning tone and be connected to the emergency caller. The disconnected party shall receive a busy signal. Systems which do not provide emergency call interrupt shall not be acceptable.
 - c. It shall be possible to connect a single push emergency call-in switch to any Administrative Phone, without effecting normal station operation. This feature is not available with the Administrative VoIP Phone.
 - d. Normal and Urgent calls shall be logged into queue for the designated administrative display phones.
 - e. Administrative Display Phones shall ring for a period of 45 seconds when they receive a call, and then stop ringing.
 - f. Each queue shall first be sorted according to call priority (emergency calls, then urgent calls, and then normal calls). Calls are sorted within each priority level on a first-in, first-out basis. When a call is answered, it shall automatically be removed from the queue. Systems, which do not sort calls according to priority and order received, shall not be acceptable. 1) The display shall simultaneously show up to four (4) Staff Call Switch Station Calls pending. Additional calls, beyond four (4), shall be indicated by an arrow pointing down thus prompting the user that additional calls are waiting.
 - g. It shall be possible to answer any incoming call simply by picking up the handset while it is ringing. It shall not be necessary to hit any buttons to answer a call unless the call has dropped into the queue.
22. Administrative VoIP Phones shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired station. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be a switchover from loudspeaker to private telephone communication when a person picks up the handset and dials ##### and enter (check mark).
- a. Administrative VoIP Phones shall be able to make a normal call to any Administrative Display Phone by dialing the number. They shall also be able to initiate an Emergency Call by dialing ****. Emergency Calls shall ring the Designated Day/Night Administrative Display Phone. The system shall provide for each station to have a PIN Numbers. By dialing the PIN at any system telephone, the administrator shall have access to emergency paging regardless of the restrictions on the particular phone being used.
23. Administrative Phones MCESS or MCWESS shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired station. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up the handset.
- a. Administrative Phones shall be able to make a normal call to any Administrative Phone by dialing the number. They shall also be able to initiate an Emergency Call by flashing the

hook switch four times. Emergency Calls shall ring the Designated Day/Night Administrative Display Phone and then their speaker will be connected to the emergency link station if not answered within a predetermined time period. The system shall provide for each station to have a PIN Numbers. By dialing the PIN at any system telephone, the administrator shall have access to emergency paging regardless of the restrictions on the particular phone being used.

24. Student Phone

- a. Student Phone shall be supported. The Student Phone can only make 10-digit (7 digit or less than or equal to 10 digit), 0 local and 911 calls. The call duration shall be set to 5 minutes. The dial tone shall be fed momentarily at 00:04:30, 00:04:40, 00:04:50, then at five minutes, calls are disconnected. The student phone can not receive any incoming calls.
- b. The Station is not allowed to dial the same number within 30 minutes and a busy signal shall be fed to the Station if the number is dialed.

25. Administrative Display Phones shall be equipped with a 4x16 character alphanumeric display panel.

- a. Administrative Display Phones shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired stations. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up his handset.
- b. The display shall normally show the time of day and day of week, the current time signaling schedule, and the numbers of up to four stations calling in along with the call-in status of each station (normal, urgent, emergency). When dialing from the Administrative Display Phone, the display shall indicate the station number and type of station (loudspeaker or handset) being dialed.
- c. The display shall also provide user-friendly menu selections to assist the operator when paging and distributing program material. Displays shall be in English with internationally recognized symbols for maximum ease of use. Systems, which require the operator to memorize long lists of operating symbols or control codes, shall not be acceptable.
- d. Administrative Display Phones shall be programmable for one of 3 station types for system access, as follows:
 1. Shall permit dialing any station in the system; turn program material on/off at their location; scroll, erase and auto-dial call-waiting queue; make conference calls and transfer calls; call forward to other administrative stations; make all-zone pages and emergency all-zone pages; have access to outside lines and be designated to receive outside line calls.
 2. Select and distribute or cancel program material to any combination of stations, paging zones, or all zones; set/reset alarm/external functions and zone paging.
 3. Bump or join a conversation in progress, manually initiate time tones.
- e. Program selection, and its distribution or cancellation shall be accomplished from a designated administrative display telephone, with the assistance of the menu display system. Distribution and cancellation shall be to any one, or combination of speakers, or any zone(s), or all zones. It shall be possible to provide three program channels at the same time.

- f. It shall be possible, via an Administrative Display telephone, to manually initiate any of eight (8) tones or any of the emergency tones. The tones shall be separate and distinctly different from the emergency tones. The tone selected shall continue to sound until it is canceled, or until the administrative display phone is placed back on-hook.
 - g. Each Administrative Display Phone shall maintain a unique queue of all stations calling that particular phone.
26. System programming shall be from an authorized Quantum Commander User via Web browser. All system programming data shall be stored in nonvolatile memory. A valid username and password shall be required to gain access to the following programmable functions:
- a. Station Initialization shall be accomplished from an authorized Quantum Commander User via web browser. All station initialization data shall be stored in nonvolatile memory. A password (separate from the password necessary for system programming) shall be required to gain access to the following station initialization parameters:
 - i. Programming and diagnostics shall be built into the Quantum Commander web server browser and be accessible only by authorized personnel. Diagnostics shall indicate passes and failures of system memory, system clock, all audio busses, tone generators, DTMF generators and decoders and the integrity of the field wiring.
 - ii. Systems not capable of supporting web-based diagnostics and any computer interface for programming and diagnostics, nor supportive of built-in diagnostics for the end user shall not be deemed as equal.
27. Rollover EOL (End-Of-Line Device)
- a. This feature shall be supported for all the Stations (Admin Display/Admin VoIP/Admin) configured with a loudspeaker. Based on the dialed sequence, (*xxx, xxx) the call will be connected to the corresponding station/speaker. If the speaker/station is busy, the call is rolled over to the station/speaker corresponding to that station.
 - b. If a handset station, configured with this feature, is busy when an Admin User calls the station, the call shall be rolled over to the associated speaker. If the speaker is also busy in this case, then the Admin call can bump the conversation.
 - c. Rollover End-of-Line features not applicable with the Station with Call Switch or Station without the speaker.
 - d. For calls initiated by a call switch or a non-dial handset, rollover to the admin speaker shall not happen.
28. Admin AAA Group (Always An Answer)
- a. This is an Administrative Display Phone feature. This feature shall be programmed from the Bogen Commander. A maximum of 10 Administrative Display Phones will be supported in an Admin Group and there shall be a maximum of 32 Admin Groups per facility. Administrative Display Phones assigned to an Admin Group cannot also be assigned as day or night admin phones for any stations in the system.
 - b. Once the Admin Group is set:
 - 1. For normal calls, if the primary Day/Night Admin Phone is busy/no answer, all the phones in the Admin Group shall ring.

2. For emergency calls, if the primary day/night phone does not answer, all the phones in the Admin Group shall ring.
3. On no answer from any of the admin phones and if the emergency announce link is configured, the call shall be transferred to the emergency announce link as per the existing procedures. Administrative VoIP Phones do not have the emergency announce link functionality.
4. On answer from any of the Admin Group Phones, all the other phones shall stop ringing.

2.05 SPEAKERS

- A. Classroom speakers and grilles (ceiling-mounted, flush) shall be Bogen CSD2X2(or equal) Drop-In Ceiling Speakers.
- B. Classroom speakers (wall-mounted) shall be Bogen Model MB8TSQ or MB8TSL(or equal).
- C. Wiring shall be done per manufacturer's recommendation, West Penn #357. All terminal connections to be on barrier strips. All cables to be labeled by room.
- D. Outdoor horns shall be Bogen FMH15T (or equal).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions, with the installer present, for compliance with requirements and other conditions affecting the performance of the Integrated Telecommunications/Time/Audio/Media System.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. The installation, adjustment, testing and final connection of all conduit, wiring, boxes, cabinets, etc., shall conform to local electrical requirements and shall be sized and installed in accordance with manufacturer's approved shop drawings.
- B. Low-voltage wiring may be run exposed above ceiling areas where they are easily accessible.
- C. Contractor shall install new rack console at location shown on plans.
 1. Solder each speaker line splice and tape each individual wire.
 2. Connect remote slave clocks to master clock in console.
- D. All classroom phones (where required)shall be wall-mounted.
 1. Mount at 54" AFF.
 2. All wiring should be concealed.
 3. Verify exact location with Architect.
- E. All Administrative Phones shall be desk- or counter-mounted.
 1. Provide standard wall 120V AC receptacle 16" AFF

2. Verify exact location with Architect
- F. Speaker and telephone lines run above ceiling and not in conduit shall be tie-wrapped to ceiling joist with a maximum spacing of 8' between supports. No wires shall be laid on top of ceiling tile.
- G. Connect field cable to each speaker transformer using UL butt splices for 22 AWG wire.
- H. Terminate field wiring on wall adjacent to rack using Telco 66 type blocks. Provide neat cross connect system for wiring. Wiring to be labeled to indicate final architectural room number that it services on the Telco block.
- I. Rack shall be labeled in numerical order with speaker/phone combinations first, speaker/outside horn combinations last. Labeling and order shall reflect final Architectural room numbers posted outside the rooms. Use three- (3), four- (4), five- (5), or six- (6) digit dialing extensions.
- J. Contractor shall provide a minimum of eight (8) hours of operational and programming instruction to school personnel.
- K. On the first school day following installation of Multicom System, the Contractor shall provide a technician to standby and assist in system operation.
- L. Mark and label all telephone outlets and/or sets with the graphic room numbers. Label all demarks IDF and MDF points with destination point numbers. Rooms with more than one outlet shall be marked XXX-1, XXX-2, XXX-3, etc. where XXX is the room number.
- M. No graphic room number shall exceed the sequence from 000001 through 899999.
 1. All outside speakers shall be on a separate page zone and time zone.
 2. All zones shall be laid out not to exceed 10 watts maximum audio power zone.
 3. All hallway speakers shall be tapped at 1 watt maximum.
 4. All outside horns shall be tapped at 7.5 watts maximum.
 5. All classroom speakers shall be tapped at ½ watt maximum.
 6. Large rooms, such as cafeterias, shall be tapped at 2 watts maximum.

3.03 GROUNDING

- A. Provide equipment grounding connections for Integrated Telecommunications/Time/Audio/Media System as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.
- B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments.
- C. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.
- D. The contractor shall note in his drawing, the type and locations of these protection devices as well as all wiring information.
- E. The contractor shall furnish and install a dedicated, isolated earth ground from the central equipment rack and bond to the incoming electrical service ground buss bar.

PART 4 - EXECUTION

4.01 DIVISION OF WORK

- A. While all work included under this specification is the complete responsibility of the contractor, the following division of actual work listed shall occur.
 - 1. The conduit, outlets, terminal cabinets, etc., which form part of the rough-in work shall be furnished and installed completely by the electrical contractor. The balance of the system, including installation of speakers and equipment, making all connections, etc., shall be performed by the manufacturer's authorized representative. The entire responsibility of the system, its operation, function, testing and complete maintenance for one (1) year after final acceptance of the project by the owner, shall also be the responsibility of the manufacturer's authorized representative.

4.02 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- A. All work described herein to be done by the manufacturer's authorized representative shall be provided by a documented factory authorized representative of the basic line of equipment to be utilized.
- B. As further qualification for bidding and participating in the work under this specification, the manufacturer's representative shall hold a valid C-10 Contractor's License issued by the Contractor's State License Board of North Carolina. The manufacturer's representative shall have completed at least ten (10) projects of equal scope, giving satisfactory performance and have been in the business of furnishing and installing sound systems of this type for at least five (5) years. The manufacturer's representative shall be capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.
- C. The manufacturer's representative shall provide a letter with submittals from the manufacturer of all major equipment stating that the manufacturer's representative is an authorized distributor. This letter shall also state the manufacturer guarantees service performance for the life of the equipment, and that there will always be an authorized distributor assigned to service the area in which the system has been installed.
- D. The contractor shall furnish a letter from the manufacturer of the equipment, which certifies that the equipment has been installed according to factory intended practices, that all the components used in the system are compatible and that all new portions of the systems are operating satisfactorily. Further, the contractor shall furnish a written unconditional guarantee, guaranteeing all parts and all labor for a period of five (5) years after final acceptance of the project by the owner.

4.03 INSTALLATION

- A. Plug disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service.
- B. Protection of cables: Cables within terminal cabinets, equipment racks, etc., shall be grouped and bundled (harnessed) as to type and laced with No. 12 cord waxed linen lacing twine or T & B "Ty-Rap" cable. Edge protection material shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.
- C. Cable identification: Cable conductors shall be color-coded and individual cables shall be individually identified. Each cable identification shall have a unique number located approximately 1-1/2" from cable connection at both ends of cable. Numbers shall be approximately 1/4" in height. These unique numbers shall appear on the As-Built Drawings.
- D. Shielding: Cable shielding shall be capable of being connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.

- E. Provide complete "in service" instructions of system operation to school personnel. Assist in programming of telephone system.

4.04 DOCUMENTATION

Provide the following directly to the Supervisor of Technology Service.

- A. Provide a printed copy of all field programming for all components in system.
- B. Provide one copy of all diagnostic software with copy of field program for each unit.
- C. Provide one copy of all service manuals, parts list, and internal wiring diagrams of each component of system.
- D. Provide one copy of all field wiring runs, location and end designation of system.

INTERCOM/TELEPHONE

- A. The communications system shall provide a comprehensive microprocessor-controlled, multiple talkback networks between telephone stations and intercom speakers. There shall be a minimum of one 12 watt talkback amplifier and one 20 watt paging amplifier for every 24 speaker stations in the system. Provide booster amplifiers for high power draw speakers.
- B. The speaker control central processor and switching unit shall be of the modular plug-in printed circuit board type, using UMOS microprocessor and TTL logic with HCM0S memory and sensing. CMOS circuitry shall be protected with transient suppression devices on all inputs and outputs. Non-volatile EPROM shall store field programmable memory. The system shall provide no less than the following features and functions:
 - 1. Unlimited communication links, (digital non-blocking) complete with DTMF signaling, dial tone, ring back and busy signals to the telephone control microprocessor. The intercom shall be connected to the telephone control cabinet for complete system interface via DTMF control. Intercom systems which do not offer complete system control via DTMF will not be acceptable. The DCS system shall utilize a separate intelligent control unit so that all systems can communicate all features and functions that are being executed.
 - 2. Amplified-voice communication with loudspeakers from any system telephone with automatic VOX switching. The system shall provide a minimum of 8 simultaneous amplified-voice intercom communications over staff loudspeakers.
 - 3. The system shall be expandable to 500 stations.
 - 4. There shall be a system-wide emergency all-call feature. The emergency all-call shall be accessed at designated staff or administrative phones or by Emergency handset or by the activation of contact closure. The emergency all-call shall capture complete system priority, shall be transmitted over all speakers, and shall activate an external relay for control of external functions.
 - 5. There shall be four (4) built-in alarm tones, each accessed by dialing a three-digit number from designated administrative telephones.
 - 6. There shall be four (4) external driver outputs, for activation of television system switching and other external control functions accessible by dialing a pre-determined

- number from designated administrative telephones or automatically programmed in software, to be determined by the Owner.
7. The system shall provide for field-programmable three or four-digit architectural speaker station numbers, to match the building architectural numbers.
 8. An architectural-number/station-number cross-reference shall be field-accessible to facilitate service.
 9. There shall be an automatic level control for return speech during amplified-voice communications.
 10. Each station loudspeaker shall be assigned to any of eight paging zones, plus all call.
 11. Each station loudspeaker shall be assigned to any of eight time-signaling zones. These zones shall be independent of paging zones.
 12. There shall be 8 time-signaling schedules with a total of 1024 user-programmable events. Each event shall sound one of 8 user-selectable tones. It shall be possible to assign each schedule to a day of the week, or manually change schedules from a designated administrative telephone.
 13. An internal program clock (with battery back-up) shall be included in the system. It shall be possible to synchronize the program clock with an external master clock.
 14. There shall be a pre-announce tone signal at any loud-speaker selected for amplified-voice communication. The pre-announced tone shall be disabled by programming.
 15. There shall be a periodic privacy tone signal at any loud-speaker selected for amplified-voice communication. The privacy tone shall be disabled by programming.
 16. There shall be an automatic disconnect of the DCS system to prevent tying up communications channels. When a telephone is lifted from its cradle and does not initiate a call within ten (10) seconds, the station shall receive a busy signal and shall automatically disconnect after 45 seconds.
 17. The entire system shall include diagnostic / programming software for system testing and for full remote maintenance.
 18. The system will also provide for the disconnect of the speaker when its associated telephone is lifted from the cradle.
 19. The telephone will be capable of generating an emergency call by pressing the “*” (star) button three times. Emergency calls can be programmed to ring a single administrative phone or a group of administrative phones.
 20. Any classroom telephone will also be allowed to access any one of the three program sources, and turn on and off the program sources to that related speaker.
 21. It shall be possible to configure the DCS system with a "sub-system" of non-dial handsets, call switches, administrative display phones and speakers. It shall be possible to program each sub-system station location as a staff station (handset or speaker and call-in switch), or administrative station (keypad-dialing DTMF telephone and alphanumeric display panel). All station locations shall also have the option of being used with loudspeakers. Systems which do not allow for this "sub-system" configuration or limit the capabilities of

each station location by not allowing loud speakers in addition to handsets sets shall not be acceptable.

22. The "sub-system" staff stations may be programmed to ring one sub-system administrative telephone during day hours and one "sub-system" administrative telephone during night hours. Day and night hours shall be user-programmable.
23. Each "sub-system" staff station may be programmed for 3 different levels of call into a select sub-system master station, as follows:
 - Level 1 - Normal/Emergency
 - Level 2 - Urgent/Emergency
 - Level 3 – Emergency
25. The speaker intercom system shall have provisions to connect a Digital Announcement System (DAS). The DAS shall be connected for automatic distribution of emergency or other user programmable voice or program information, when activated by the system wide emergency all-call feature specified herein. The DAS shall be capable of storing up to 12 minutes of audio information in one variable length message. The message shall be available for playback as a continuous loop or in single play mode.
26. The system shall have 24 spare intercom ports.

TELEPHONE

The system shall have the following capabilities:

- A. Scalable Voicemail –Handle up to 40 simultaneous calls. Broadcast a single voicemail to all employees, a specific department or just one team. Address messages by extension or name. Have voicemail messages “find” you and alert you to new messages.
- B. Secure “Meet Me” Conferencing – The built-in 128-party conferencing capability makes it easy for all users to host their own personal password-protected conference bridge (up to 64-parties per conference) to securely collaborate with customers and colleagues. Its unique call capacity lets you host a multitude of calls simultaneously.
- C. Automated Call Routing – With the ability to create an unlimited number of automated attendants (each with an unlimited number of levels). Customize attendants to handle calls by time of day, day of week or other variable. Program attendants to recognize callers and deliver personalized messages to them. Pre-record announcements (holiday greetings, promotions) and schedule them for future use.
- D. Call Recording – Built-in recording of incoming or outgoing calls. Set the frequency of recorded calls (all calls or a percentage of calls). Record calls on demand with the push of a button. Recordings can be sent directly to voice/email mailboxes as a WAV file attachment for forwarding via email.
- E. All users can spontaneously host their own personalized and secure conference calls.
- F. Communications assurance – the ability to easily record calls. The system shall have, at a minimum, the following features:
 1. The system shall be completely solid state utilizing time division digital technology with stored digital program control and digital transmission. The system shall contain main operators console(s) with DSS/BLF locations (CAP). Digital single line type telephones, call switches and handsets shall be utilized in classroom and staff locations. Digital multi-line telephones shall be used at the administrative locations. Systems shall be able to utilize all different types of devices. The System shall be registered under Part 15 (class

A) of the FCC regulations for connection to outside telephone lines. The system shall be capable of either "squared" or "non-squared" operation as desired.

2. The Telephone System shall have unrestricted speech paths, with a non blocking digital architecture and shall be fully integrated.
 3. The system shall have a minimum wired capacity of 32 lines by 192 stations. Wired capacity is defined as the maximum configuration allowable on the system. This capacity may be obtained through the use of manufacturers' standard hardware and software expansion as allowed by system architecture. Wired capacity shall be a standard configuration of the manufacturer. The system shall contain; All cabinets, wired circuitry, circuit cards, power supplies, and programming firmware. Systems which require expansion cards or add on modules to reach the specified capacities are not acceptable. Installed capacity per plans plus 16 spare for future expansion. Initially the system shall provide for 16 trunk lines.
 4. Provide direct-dial private two-way telephone communications with other administrative stations and staff stations.
 5. Provide two-way amplified-voice communications with any station loudspeaker.
 6. DCS system programming shall be from a standard MS-DOS Computer Terminal (local or remote), and allowed administrative telephone(s). Class of Service Programming (COS) for system shall be on a per line / per station basis allowing for flexible assignment of functions. Toll restriction administration class of service for enable and deny tables shall be class of service programmable by time of day.
 7. System initialization shall be accomplished from DCS-PCI. This is a Windows based program that allows for all the programming of the virtual stations. All system initialization data shall be stored in non volatile memory.
 8. All telephones may turn program material on or off at their associated loudspeaker by dialing a pre-set code.
- D. The system shall offer at least the following standard operations:
- Alpha-Numeric Calling Party and Line Display
 - Automatic Number I.D. (Caller I.D.)
 - Automatic Route Selection
 - Access Denied
 - Call Forwarding
 - Call Conferencing (5 way unsupervised)
 - Call Parking
 - Call Pickup
 - Class of Service (Each Station & Line)
 - Class of Service Program Storage to Disk

- Computer Telephony Interface (OTI)
- DID Trunk Support
- DISA Trunk Support
- Night Transfer of Ringing Assignments(3 schedules)
- ISDN BRI Data transmission
- Off Premise Extensions
- Open Applications Interface (OAI)
- Music on Hold
- Power Failure Transfer
- Station Message Detail Reporting (SMDR)
- Toll restriction (allow and deny tables)
- Do Not Disturb
- RS 232 Serial Ports
- SMUR and programming Via Serial Port
- Station Locking button
- Station Speed dial (10 per Station)
- System Speed dial (200 minimum capacity)
- TAP - Hookswitch Flash for PEX functions
- TSAPI I TAPI compliance and compatibility
- Intercom System (telephone)
- Intercom Speaker System/Programmable Access
- Intercom Line Lock-out
- Mute of Handset and Microphone Transmitters
- Multiple Attendant Positions
- Message Waiting Lamps
- T-1 Direct interface
- Voice Mail Interface

- Toll Restriction Override with access code
 - Least Cost Routing
 - Digit Translation
 - Three Color LEDs
- E. System shall provide a Station Message Detail Report (SMDR) System. All terminal equipment, wire, installation and programming to allow for local traffic analysis of the telephone system from any RS-232 compatible serial device (e.g. data printer). This feature shall allow for a record of calls to be kept for each telephone station in the system. All incoming and outgoing calls greater than 20 seconds in length shall be recorded. The outside telephone line used and digits dialed (up to 32) shall be recorded. On incoming calls, the answer time (in tenths of a minute) shall be kept.
- F. The system shall be connected to the public telephone network. The communications system contractor shall develop a comprehensive cut-over plan with the Owner's representative to ensure an orderly transition of service to the new telephone system. Provide Owner with all pertinent FCC registration numbers and RE numbers to allow for the connection of the system to the public telephone network as customer premise equipment.
- G. The system will allow for the addition of third party developed equipment. One example is on site paging. This is an internal paging system that interfaces with the DCS system to get a call to any person wherever they are within the operating radius of the system.
- H. The system shall have the capability of using wireless digital telephones for assignments to the staff to allow mobile communications throughout the building complex. This telephone shall operate the same as any administrative telephone in the system. The phone will be able to do programming and system functions within the operating range. This phone will be a four line LCD instrument and Interactive.
- I. All classrooms will have a built in PA system. This shall be accomplished by picking up the classroom phone and dialing its related speaker.
- J. The DCS will automatically adjust to daylight savings time when these changes occur. This will be pre-programmed into the software for automatic update as a program function.
- K. The DCS will allow for certain speakers or horns to be excluded from all-call, but will allow them to be included in a zone or in an emergency call, A list of speakers and horns will be provided by the Owner during set-up.
- L. The system shall have the capability to designate a Student Phone. This phone shall include the following programmable features:
1. Restrict phone numbers
 2. Restrict area code
 3. Timed conversation
 4. Allow a number to be dialed only once a day
 5. Phone will only work during programmed hours

- M. Virtual Station technology shall be utilized. A Virtual station is programmed via (DCS-PCI), a Windows based software. This feature will allow for complete flexibility in grouping staff communication devices through programming as software defined stations.
- N. The DCS will have both day and night COS assignments. This will allow for the same phone to maintain two 005 services.
- O. The DCS will allow for group listening for programmed administrators. This is used for the additional monitoring of conversations without the third parties knowledge.
- P. The system will have provisions for supporting computer terminals on the digital ports. These computers will have the same features as administrative phones. These stations will also follow the same COS as any other station.
- Q. Interactive LCD's will allow the user access to a level of programming. This feature will allow the end user to create a more flexible station which will meet their needs.
- R. The LCD's will log all calls. This creates a printout that can be retrieved at a later date on the SMDR report. These calls can be answered in the order that they were placed or in any order that the user chooses.
- S. The system will be capable of supporting a call processing system that will be compatible with the DCS. This will also turn on and off message waiting lights. The call processing system will have 500 mail boxes with 18 hours of recording time.
- T. Subdued off-hook Voice Announce: a subdued announcement can be made from one station to another station that is off-hook and busy on a call. With this feature the announcement is delivered and responded to in a subdued manner that prevents the distant party from hearing either the announcement or the response. Users can respond to the announcement in a verbal or non-verbal manner. They affect a response by pressing a Mute button or soft key response and speaking into the handset. They affect non-verbal response by pressing a pre-programmed button to send a message to be shown on the display of the announcing station (if it is an LCD speakerphone).
- U. System Telephones listed as design basis only: Refer to form of proposal for preferred alternates. Alternate manufacturer shall be accepted where specification meet or exceed the design basis, Nortel, Cisco, Toshiba shall be considered equal.

Provide telephones for classrooms, resource and teacher workrooms shall be AVAYA 7208, quantity as required for one device at each outlet location as indicated on plans.

Provide telephones in the Administration Area, Media center (including ancillary rooms) shall be AVAYA 4621, quantity as required for one device at each outlet location as indicated on plans.

Provide one AVAYA 4630 telephone at Administration Area secretary location.

V. Each phone outlet indicated on plans shall be provided with a telephone.

- W. Ceiling mounted speakers shall be 8" full range loudspeaker / baffle combination. Minimum 6oz. nominal magnet weight, 7 watt continuous power, with matching dual 25/70 volt transformer. Transformer shall be capable of delivering at least 6 separate wattage taps from 1/8 watt to 4 watts. Flush mounted onto steel back box.
- X. Wall speakers shall be 8" full range loudspeaker

- Y. Outdoor weatherproof paging / program speakers shall be UL listed, flush mounted moisture resistant type paging speakers for voice and tones with matching transformer.
- Z. Surge protection: Make sure receptacles serving ANY telecommunications equipment are fed from panels with line conditioners.

BATTERY BACK-UP SYSTEM:

Provide a 4 hour battery back-up system for telephone and intercom systems. All setup data and configurations shall be stored securely on the server to bring the system back up in the event of a system failure.

REMOTE MAINTENANCE FUNCTION

- A. Remote maintenance shall be provided for the entire system. It shall be possible to perform all programming and software maintenance functions on the system from a remote computer located at the installing contractor's site and/or from a central Owner maintenance location to be determined by the Owner. Automatic line sharing devices shall be included at remote sites so that an existing outside line resource may be used for remote maintenance when not being used for its primary function.
- B. Provide, install and configure a complete and functioning remote maintenance system. System shall include, but not be limited to, all on site hardware and software, modems, transfer devices, installation, programming, testing, etc. and off site modems, software, installation, programming, testing, etc. (Owner will provide an MS-DOS based computer for Owner remote end location).
- C. Connect and test the remote maintenance functions for all of the systems under remote control. Perform actual remote maintenance operations from the Owner's remote site and demonstrate proper system operation in front of Owner's designated maintenance personnel.
- D. Provide 4 hours minimum instruction time in the operations of the remote maintenance features.

MATERIALS

- A. A comprehensive, documented communications wiring system is to be installed. Wiring is to be identified by room number, segregated, neatly laced, and terminated on telephone type punch blocks. Back boards and cross connect fields shall be neatly organized as to function. (i.e.: intercom, telephone stations, data network etc.) All termination points are to be labeled with function. Data cables shall be certified as usable and checked using the cable certification sheet. Data cables shall be labeled as per the data identification
- B. VOIP system shall conform to the requirements of section 17200.

INSTALLATION:

All installations shall comply with the requirements of the National Electrical Code (NEC) for neatness and appearance in addition to any required local electrical codes. The Contractor shall comply with all local safety and installation codes and practices related to earthquake standards. The Contractor shall be familiar with all National Fire Protection Association (NFPA) Fire Stopping Codes and shall comply as required. All equipment shall be securely mounted in enclosures or special mounting devices made for the purpose. All switches, jacks, and receptacles shall be clearly, logically, and permanently marked.

C. Adequate ventilation for the equipment installed in equipment racks shall be provided to maintain manufacturer specified heat tolerances for the installed equipment. All equipment racks shall be properly grounded to meet NEC code requirements and to prevent electromagnetic or electrostatic interference. Without claim for extra payment, the Contractor shall make minor moves or changes in equipment locations to accommodate equipment of other trades or the architectural symmetry of the facility.

D.

MEDIA RETRIEVAL

GENERAL DESCRIPTION:

- A. VCR and DVD channels of control are to be provided with additional future channels available by providing only the encoder unit(s).
- B. The station with access to a media channel shall receive, when connected to a media channel, a confirmation of access control of the media channel in each location shall be through the local teach computer..
- C. Upon completion of media use, the station may "release" the channel for other use. Allowed control stations may reset the media channel.
- D. The MC unit shall have up to user definable functions for each of the control channels. For maximum flexibility and consistent system setup, there shall be no restriction as to which telephone key controls a desired function.

VIDEO DISTRIBUTION AND CONTROL SYSTEM:

- A. A Video Distribution and Control System shall be provided in the location indicated on project drawings for the storage, origination and distribution of audio/video programs to television receivers in the building. The Video Distribution and Control System shall include a Television Distribution System, video all-call system, Video Distribution and Distribution System as detailed herein.

TELEVISION DISTRIBUTION SYSTEM

- A. Provide a complete Television Distribution System shall be through streaming media via the IP based media retrieval system.. The system shall be designed for adjacent channel operation with all inputs individually modulated by frequency agile modulators. Automatic override of normal programming on all channels shall be controlled by the Administrative Headend computer and/or from remote computer stations.
 - 1. Provide a flush rack mounted cable ready 13-inch color LED flat screen receiver/monitor to permit line monitoring of all active channels in the system.
 - 2. Provide a minimum of one (1) active administrative distribution channel and one (1) active media distribution channel for each media distribution source and CATV demodulated source supplied in the initial system.
 - 3. Comply with all standards set forth in FCC Rules, Part 76.

VIDEO SOURCE AND CONTROL SYSTEM

Provide a Video Source and Distribution System consisting digital streaming Video on Demand Server

BULLETIN BOARD, MESSAGE CENTER:

There shall be a computer and associated software supplied to support a scrolling message center. These images are to be distributed facility wide via Streaming IP.

- A. The message center shall be provided to display, in scrolling fashion, one line messages from left to right, right to left, top to bottom, bottom to top and from the center to the left and right. The user shall have the ability, via pull up menus on the computer to alter the scroll mode.
- B. The user shall have the ability to create, delete, edit and schedule messages as they choose in each file. It shall then be possible to schedule the precise time at which each file is to be displayed. There shall be no limit to the number of message files created nor the number of messages in each file. These functions shall not require the user to interrupt the active message file distribution. The system shall allow the active message file to be deleted, edited and scheduled while remaining on line.
- C. The user shall have the ability to change the scroll rate of the messages being displayed by the message center. This shall be adjustable from one second to ninety nine seconds.

E.

F. VIDEO BULLETIN BOARD

- A. A video bulletin board shall be provided to display, facility wide, bulletin board type messages. These bulletins shall utilize the entire television screen. The software for this video bulletin board system shall support unlimited bulletins and bulletin tiles.
- B. The user shall have the ability to create, delete, edit and schedule multiple bulletin board files with as many bulletins as they choose in each file. It shall then be possible to schedule the precise time at which each file is to be displayed. There shall be no limit to the number of bulletin board files created nor the number of bulletins in each file. It shall be possible to schedule bulletins for an entire week.
- C. Creating, deleting, edition and scheduling a bulletin board file shall not require the user to interrupt the active bulletin board distribution. The user shall have the ability to change the scroll rate of the bulletin board being displayed by the electronic bulletin board. This shall be adjustable from five seconds to ninety nine seconds.
- D. When both video message center and the video bulletin board are supplied, they shall both be run simultaneously from a computer.
- E. Both the video message center and the video bulletin board shall be displayed simultaneously on a single computer monitor.

MULTIMEDIA MANAGEMENT CONTROL

- A. The system shall provide local control of remotely located media sources using a classroom workstation computer as the controlling device. Any combination of these control devices can be mixed within the system. Each classroom shall initially be equipped with an Owner provided teacher's computer, and a classroom network interface. Each classroom shall also be equipped with a teacher's panel to integrate local audio and video input devices and the teacher's computer to the permanently mounted classroom Projector.
- B. Teacher's Workstation Control

1. The Multimedia Resource Management System shall provide a teacher's workstation control interface with the ability to control centrally located multimedia equipment such as the following:
 - a. VCR
 - b. Laser Disc Players with both level 1 and level 3 interactivity
 - c. CD-I
 - d. CD-I with CD-ROM interface
 - e. Multimedia source computer
 - f. The World Wide Web
 - g. DVD
 - h. Cable tuners
 - i. Satellite tuner
 - j. Audio Tape Recorder/Player
 - k. Audio CD
 - l. DAT Machines
 - m. 16 mm film chain
 - n. 35 mm slide to video projector
 - o. Streaming Video

2. The computer workstation can also be used to view any of the following passive, non-controlled sources:
 - a. Broadcast Channels
 - b. Satellite Inputs
 - c. Cable Channels
 - d. Video Bulletin Board
 - e. Teleconference and Distance Learning Devices

3. Selecting any of these sources, both controlled sources and passive/non-controlled sources, can be done by choosing the appropriate menu item or icon from the graphical display.

4. The teacher's workstation control interface shall provide the following TV controls (provide active network electronics to support control unit):
 - a. On/Off
 - b. Volume up and down
 - c. Channel up and down
 - d. Mute
 - e. Local input

5. The teacher's workstation control interface screen shall graphically represent multimedia resource control functions. The following multimedia resource control options may be activated or selected using the keyboard or mouse.
 - a. Play
 - b. Stop
 - c. Step Forward/Fast Forward (symbol button)
 - d. Step Reverse/Rewind (symbol button)
 - e. Pause
 - f. Mute
 - g. Frame
 - h. Chapter
 - i. Clear

- j. Enter
 - k. Cursor Up
 - l. Cursor Down
 - m. Cursor Left
 - n. Cursor Right
 - o. Search for source (or channel) Up and Down
 - p. Volume Up and Down
 - q. Display/Menu
 - r. On/Off
 - s. 0 – 9 Numerical Keys
 - t. Closed caption capability option
6. The teacher's workstation control interface screen shall provide graphical display of the multimedia control functions. The functions displayed shall be specific to the resource type being accessed by the user. All inactive functions shall not be visible to the user. All functions shall be user programmable and assigned to each resource type on an individual basis.
7. The teacher's workstation control interface screen shall be logically arranged for easy use. All user commands will be achieved through selection of menu items or graphical icons or buttons.
8. An updateable display area capable of providing user feedback and real-time graphical display of attached resources shall be provided for the teacher workstation control interface. The title of the courseware material loaded into the active multimedia device shall be displayed so that the user can verify the courseware they are currently using. The display shall also be used to show available cable and satellite programs. Pressing the appropriate menu item or button will display the selected input or channel on the computer screen.
9. The resource display screens shall have an associated graphical representation of the available media resources. The graphic will provide information about the media resources which are available to that user and which resource is currently in use. The multimedia resource management system shall fully identify the media resource to the user with the user-programmable alphanumeric identification. It shall not be acceptable to identify the sources as A – F only. Pressing a key to cycle through available sources shall also not be acceptable.
10. The teacher's workstation control interface shall provide access to all control functions for the remote multimedia devices

D. Web Browser

The teacher's workstation control interface shall be accessible using a standard web browser (ex. Microsoft Explorer or Netscape). **No client software shall be required to be loaded on the teacher's workstation.** Since the standard web browser is the only interface required, any PC with access permission to the school's LAN can browse the databases, schedule courseware and resources, or control the components of the system from any remote location with Web access. Systems requiring client software will not be acceptable.

E. Internet Access

Any school network with access to the World Wide Web or with the ability to cache favorite web sites will have instant access to the Web as a controllable resource. No additional program shall be needed to be launched and it shall not be necessary to exit the Multimedia Resource

Management program to visit a web site. Pressing "Back" on the Web Browser will return the user to the last controllable device.

F. Open Data Base Connectivity (ODBC)

The system shall directly read any ODBC compliant database. Systems capable of only porting existing databases through import-export wizards shall not be acceptable.

G. Multimedia Resource Management Server

1. The Multimedia Resource Management Server provides or controls the following functions:

- a. Multimedia device and courseware scheduling for local and remote locations
- b. Courseware Material Database Control, including search and edit of multiple local and remote multimedia database catalogs
- c. Audio, video, and text announcements
- d. Access to the School LAN and the District WAN
- e. Remote access to the system from the Internet
- f. System Utilization Statistics
- g. Interface Help Screens
- h. System Setup and Configuration
- i. Menu Screen Generator
- j. Remote diagnostics
- k. System-wide security

2. A Multimedia Resource Management Server shall be provided with the following configuration:

- a. Pentium 4 PC running at a minimum of 2.4 GB
- b. 1GB MB of RAM Memory
- c. 180 GB of Hard Disk
- d. 3.5" High Density Floppy Drive
- e. SVGA Color Monitor with 16MB RAM VGA
- f. Full Function Mouse
- g. Two (2) RS232C Serial Ports
- h. One (1) Parallel Port
- i. 56K or higher modem with remote control software allowing all server functions to be controlled from a remote location for remote diagnostics
- j. 10/100 MB Ethernet Network Interface Card

3. The Multimedia Resource Management Server shall be provided with a Linux operating system, Apache Web server, MySQL database and Perl application software with the appropriate number of client licenses.

H. Multimedia Resource Management Software

1. The Multimedia Resource Management software program shall be a Windows NT application to control and catalogue multimedia courseware material, such as laser discs, video tapes, and computer presentations in Power Point and HyperStudio. The user shall be able to search for the desired courseware material by author, subject matter, applicable age group, keywords, catalog number, title or media type. It shall be possible to logically combine different fields to narrow down the number of matches found. A window displaying all of the matches for the information entered shall display when a search is initiated.

2. Once the appropriate material is found, the user shall be able to transfer information directly to the scheduling portion of the software. For scheduling, it shall not be necessary to exit the database and enter a different program.
3. It shall be possible to display or print the courseware material available, in either summary (title only) or in detailed form (title accompanied by a brief description).
4. Media Scheduling
 - a. The media scheduling portion of the software shall permit the classroom teacher, Media Center personnel and others to schedule courseware material to be viewed at some future time or date. The searching and scheduling can be done from any computer on the school's LAN or the District's WAN or from any computer with access to the Internet from any location.
 - b. For scheduling, a full calendar display shall be provided. Non-school days, such as weekends and holidays, shall be indicated. The user shall be able to scroll through the calendar by week or month to arrange for advance scheduling of programs. If a desired time is unavailable for scheduling, information shall be provided which indicates who is using the courseware or media source device. This will permit users to "trade" or adjust scheduling. Systems which make it difficult to obtain this information or force you to exit the scheduling portion to get the information shall not be acceptable.
 - c. The scheduling software shall track all denied requests as well as the reasons for denial. This provides valuable information to justify expansion of the system.
 - d. It shall also be possible to enter the exact time (hours and minutes) when the courseware is to be scheduled. Courseware can also be scheduled by teaching periods. The teaching periods or modules may be customized to match the periods adopted by the school.
 - e. Multiple rooms may be scheduled to view the same courseware material simultaneously. If a particular piece of courseware is copyrighted for one viewer only, the software shall not permit multiple viewers to be scheduled.
 - f. A "picklist" of the schedule shall be available in the Media Center to permit media personnel to load the required courseware into the proper media source device when it is required. In addition, a reminder message shall be provided on the Multimedia Resource Management Server, if the required courseware material is not loaded when it is needed. To serve as an alerting signal to the media personnel, the reminder message can trigger an external light or buzzer or send an e-mail. A silence button shall be provided on the computer screen to allow the media personnel to silence the alarm. The tone shall automatically restart within a pre-programmed amount of time.
 - g. In the scheduling process, the software shall automatically select the least-used media source device, to avoid overworking any one device. The scheduling software shall also minimize the number of times courseware material must be shifted between devices. If the same courseware is used several times during a given day, the software attempts to keep it in the same media device. The software shall provide an automatic reminder when routine maintenance is required on a particular media source machine.

5. Interactive User Help

The software shall provide complete interactive help. Selection of the "Help" button at any time shall provide assistance relevant to the task the user is attempting to complete. There

shall also be a built-in "Help Index" which shall permit the user to learn more about any of the key components of the media control software. In addition, the software shall provide detailed error messages and other comprehensive messages to assist the user.

6. System Utilization Statistics

a. The system shall document and store the following information:

1. Media Source Device Usage. Shall indicate the hours of use by week or month, with
2. denials by media source device category.

3. Teacher Usage. Shall provide the date of usage, courseware title, time used, classroom number, and media source device used.

4. Courseware Usage. Shall provide the date used, total hours used, catalog number and media source device used.

4. Denied Reports. Shall report each denial, the date and the reason for the denial, indicating whether the courseware and/or media device were not available.

b. The stored information shall be available to the System Administrator in an ODBC format for custom formatting for particular reporting needs.

7. Status Screen Generator

The software shall automatically provide information concerning the state of the media devices and the courseware titles scheduled for each classroom to a character generator. This information shall then be displayed on the classroom monitor when the "Menu" button on the classroom remote control is pressed. When using the handheld remote no interface with the workstation is necessary. **Systems not providing an onscreen navigator with at least 2 channels will not be considered equal**

8. Media Center Pre-Cueing

The software shall allow the Media Center operator to pre-cue courseware on any media device to the exact position requested by the person who scheduled the courseware. The Media Center control of the media device shall be provided without having to schedule the courseware to the Media Center for pre-cueing then rescheduling it to the classroom.

I. Source Controller

When required, the source controller shall support at a minimum 8 IR and 2 RS232 controlled resources such as VCR's, Laser Discs, DVD players, and PC or Macintosh workstations. The source controller translates network commands from a workstation or a handheld remote control into those specific to the sources being controlled. Systems utilizing telephone type DTMF control shall not be acceptable.

J. Multi Site Interoperability

The system shall be able to schedule and control all courseware, sources and functions of the other school's headend from any teacher's workstation computer within the school, and distribute that programming to all classrooms within the facility.

K. Off Premises Control

1. The system shall be able to schedule and control an off-premises system of the same manufacturer from any teacher's workstation computer within the school.
2. The system shall be able to receive scheduling instructions from an off-premises system of the same manufacturer, from any teacher's workstation at the remote site.
3. These control and origination features may not be limited by distance between the local and off-premises schools.

VIDEO ON DEMAND SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnishing of all engineering, labor, project management, materials, tools, equipment, and sources necessary for the complete installation or modification of instructional technology network as shown on the plans and as herein specified.
- B. It is the intent of these specifications and the accompanying plans that the Contractor furnishes and installs a system complete in every respect and ready to operate. All miscellaneous items and accessories required for such installation, whether or not each such item or accessory as shown on the plans or mentioned in these specifications, shall be furnished and installed. The architectural, structural, mechanical, and electrical drawings and specifications are included in this division in that they establish requirements and limitations of work to be performed under this section.
- C. It shall be the responsibility of each bidder to examine the site, plans and specifications carefully before submitting his bid, with particular attention to errors, omissions and conflicts between city ordinances, plans and specifications. Any such discrepancy discovered shall be brought to the attention of the Engineer and will be included in the Base Bid.
- D. The Video-on-Demand System must consist of the following features that will be specified in detail below:
 1. DIGITAL VIDEO STREAMING SERVER, A/V Decoders and Modulators
 2. MPEG1 & 2 ENCODING/LOADING STATION
 3. ONLINE VIDEO CENTER / HTML WEB BROWSER INTERFACE, providing control & scheduling of centralized Multimedia Resources via Web Browser Interface.
 4. ETHERNET CONTROL SYSTEM, providing classroom workstation control and administrative control of networked flat TVs and projectors located in throughout school(s).

PART 2 – PRODUCTS

2.01 MEDIA SERVER

- E. The Media server shall consist of, but not be limited to the following features & functions:
 1. The Media server shall be located in the main Media Center. It shall be rack mounted into the media cabinet to keep it clean and prevent bumping and jarring. It shall feature forced-air cooling. Cooling air shall be drawn through a front cleanable filter and exhausted out of the rear of the case. The rack mount case shall be constructed to provide adequate airflow over all components including the Media server and Video on Demand Server.
 2. The Media server shall minimally consist of a 2 GHz Intel™ Core2Duo CPU with 1 GB DRAM and 80 Gigabytes of hard disk storage.
 3. The operating system shall Linux, a multitasking TCP/IP capable OS. It shall communicate over TCP/IP without modification. It shall be compatible with all client operating systems and software.

4. The Media server shall communicate with all classroom PC or Macintosh workstations simultaneously via Web browser. The communication link will provide teachers with schedule updates in real time as they occur. Teacher (client) login to server shall take no longer than 3 seconds.
5. The Media server shall communicate with RS232 Plasma & LCDTVs, RS232 LCD Projectors with RS232 TV Tuners, Ethernet Television Control Units (TCU) and Ethernet Media Control Modules (MCM), via TCP/IP over a Local Area Network, Wide Area Ethernet Network, and or Internet.
6. The Media server must support remote maintenance and upgrades of the Server software and all other video on demand software. No system will be accepted that requires onsite service as the primary means of updating and providing software fixes and releases. The District shall grant secure firewall permissions for remote login and diagnostics of the Media Server. The multi-tasking Media Server must continue to operate in a fully functioning mode while remote login and diagnostics are being performed. This architecture allows accurate system diagnosis under fully "loaded" conditions via the network, or the Internet. Systems that require users to disconnect normal functioning to cease during remote login and diagnostics shall be unacceptable.
7. SSH, Port 22 on the District's firewall shall be made available for secure remote maintenance and upgrades and synchronization of the Media Server to the National Atomic Clock. To provide Network Time Syncing of Set Top Boxes with Clock Displays, firewall Port 123 will be made available.
8. The Media server shall administer all software licenses and software upgrades via the LAN, WAN, Internet and/or modem.
9. The Media server shall be a wholly graphical based system for configuration and diagnostic maintenance. Systems utilizing character based configuration utilities, are unacceptable.
10. The Media server shall automatically synchronize its internal time clock with the National Atomic Clock via Internet access to Net Time. The Media Server shall then synchronize all LED clocks at least once a day. If the Media Server is shut down for routine maintenance, the ACI shall continue to display accurate time for an indefinite period of time.
11. The Media server shall be capable of administrator programmed automatic video display power down during non-authorized hours for energy conservation. For example, if the administrator wants all video monitors powered off from 5:00pm to 6:00am the Media Server will prevent the video monitor from being turned on during this time. If an unauthorized user attempts to manually power the video display on, the system will immediately power the video monitor off. The Media Server must constantly poll and receive current status from the networked plasmas and LCD projectors. Logs for system and lamp usage shall be provided for administrators. Systems, which periodically send a power off command, are not acceptable.
12. During TV power down time, the ACI digital LED clock display shall be capable of being dimmed to one of four brightness settings or off to conserve energy and system life.
13. The Media server shall administrator Video All Call and Video Zone Page announcements. Quantity of Video Paging Zones shall be unlimited. Configuration shall be graphically based and user-friendly. All video monitors in the District will be remotely turned on/off and controlled using this software and hardware feature. The system administrator can see in real time that displays are On, Off, Not Communicating, what channel a teacher is viewing, or if displaying images from their workstation.
14. The Media server shall support optional Playlist software. Playlist allows any zone of TVs to be turned ON, tuned to a channel, play an MPEG title from the Digital Video Server. The Playlist is a pre-programmed automated event that can occur one time, or repeat as many times as desired, at any time. When the Playlist event is finished TVs are returned to their state prior to the

automated Playlist event. Multiple Playlist events can be pre-scheduled. Typical applications include Bulletin Board, Weather Channel, News Channel broadcasts to Lobbies and Cafeterias. Daily applications such as The District's Morning News Broadcast can be pre-encoded and auto-play during the pre-scheduled Playlist event. Special events like a digital title playing on the Cafeteria TVs for the PTA between 7:00PM and 8:00PM can be easily accommodated.

15. The Media server shall automatically produce a graphically based Menu Channel, which shall be capable of being broadcast over the schools video network. Via an asynchronous communication link, the Media Server shall be constantly updated by teachers using their Media scheduler software. The Media Server shall be supplied with a composite AV output and an RF channel modulator.
16. The operating system shall be able to support an unlimited number of TCP/IP connections.
17. The operating system shall support multiple IP addresses simultaneously. This feature allows Intranet IP addressing to be combined with Internet IP addressing, and VLANs.
18. The Media server shall not use any proprietary network topology to communicate with other workstations to perform media control and/or scheduling functions. Systems that require multiple workstations to control and/or schedule media playback devices are unacceptable.
19. The Media server shall contain and maintain all configuration databases as well as scheduled event data. All PC and Macintosh workstations on the LAN shall have access to the Media Server databases via Media controller, Media scheduler, MediaAdministrator as well as common FTP and Telnet connections. The Media Server shall allow password protection at varying levels.
20. The operating system shall support a minimum of 1024 serial port connections, allowing search capability and serial control of every VCR, DVD, LDP, Macintosh, PC, etc. in the Media Center head-end. The system shall control base band video routers and/or broadband video networks.
21. The Media server shall have a minimum of three unused expansion slots and must be capable of being expanded to support Digital Voice Applications, Intercom Integration, and Security alarm integration. Systems that require additional computers to perform these functions are unacceptable.
22. The Media server shall provide reporting capabilities on the usage of the system. At minimum, reporting required shall be:
 - a. How many times is each video source scheduled and used
 - b. How often a media title is scheduled and used
 - c. How often a particular teacher uses Media controller
 - d. What titles a particular teacher has scheduled during a specific period of time
 - e. What room locations use the system most frequently
 - f. Hours of burn time for each projector lamp
 - g. Reporting shall be ad-hoc with Media Administrators being able to customize reports.
23. The Media server must dynamically balance usage of sources. The Media Server must be cable of automatically cycling the playback sources so no source is used considerably more than another source. The Media Server shall automatically assign sources based on availability and system usage, however, the media specialist shall be able to override the Media server and assign and schedule sources manually.
24. The Media server shall be supplied by ETR, or be a pre-approved equal.

2.02 DIGITAL VIDEO SERVER

- A. The DVS (VOD Server) shall consist of, but not be limited to the following:

1. The Video-on-Demand Digital Video Server shall be located in the main Media Center. It shall be rack mounted into the media cabinet to keep it clean and prevent bumping and jarring. It shall feature forced-air cooling. Cooling air shall be drawn through a front cleanable filter and exhausted out of the rear of the case. The rack mount case shall be constructed to provide adequate airflow over all components.
2. Central video service will be provided through an MPEG1&2 based Video-on-Demand Digital Video Server system with support systems. In addition to the Video-on-Demand file server with mass storage, the support systems will include an MPEG encoding/DVS load station.
3. The Video-on-Demand Digital Video Server unit will provide playback of motion video sources via IP & RF streaming. The VOD server shall store motion video signals in MPEG1&2 formats on hard drives with data protected by a RAID controller. The VOD server shall deliver video to the RF Cable distribution system through multi-channel decoder cards that convert MPEG signals into composite audio/video signal, then processed by RF modulators. The VOD server shall also simultaneously stream IP VOD to MPEG capable players on PCs and Macs. The server unit will consist of one integrated rack mounted unit.
4. Minimum capacities of the VOD Server:
 - a. Intel™ Core2Duo based server unit with two 1000Mb Ethernet interfaces.
 - b. Hard disk storage will be based on a RAID controller and RAID array with swappable drives.
 - c. 4-16 channels of digital MPEG1&2 video available in mixed bit rates from 1.5Mb to 10Mb. 740x480 resolution with 30 FPS each.
 - d. Includes MPEG2 decoder for each video stream (MPEG2 decoder will also decode MPEG 1 files).
 - e. Provide a minimum of four hundred (200) hours of on-line storage using RAID Level 5 storage protocol. Allow for future expansion.
 - f. Install all components in the head end room.
 - g. Systems incapable of TCP/IP control will not be considered equivalent.
 - h. System shall be developed and provided by ETR, or equivalent.
5. The DVS shall be capable of delivering digital video streams over the District's network. VLC Player with MPEG2 decoder is MediaMaster Certified for teacher playback. The District will determine if adequate bandwidth is available and prioritized for this application. The IP streaming option may be disabled for networks with bandwidth limitations.
6. The Video On Demand Digital Video Server may be encompassed with the Media Server in single rack mounted unit.
7. The Video On Demand Digital Video Server shall be supplied by ETR, or be a pre-approved equal.

2.03 DIGITAL VIDEO ENCODING STATION (DVES)

- A. The Digital Video Encoding Station shall consist of, but not be limited to the following:
1. The DVES is an integrated package allowing the user to encode , video from multiple sources, assign file identification & search criteria, and load media onto the Digital Video on Demand Server. The system includes the following minimum components and capacities:
 - a. Intel™ Core2Duo based unit with 1 GB DRAM memory and 160 gigabytes hard drive storage with one 1 GB Ethernet interface and utilizing Microsoft™ Windows XP™ OS, providing a minimum 17" monitor and multi-media speakers with keyboard and mouse.
 - b. GUI Interface for setting video capture and compression parameters.

- c. MPEG 2 compression card (Half D1) with MPEG 1 capability.
 - d. Hardware and software to transfer files to the Digital Video Server.
 - e. Ability to preview and cue the video and audio source (analog monitor with looping audio and video inputs).
 - f. Audio follow video manual switch for various sources.
 - g. VHS player and DVD player supplied.
 - h. The encoding process shall not require a full time attendant.
 - i. Built in TV Guide, dynamically updated via Internet connection. Ability to preschedule unmanned encoding of CATV broadcasts during school hours, evenings, and or weekends.
 - j. DVS Loader software to be preinstalled on the DVES to allow District to transfer encoded titles from the Digital Video Encoding Station to the Digital Video Server. DVS Loader automatically synchronizes the encoded title into the Media server title database.
 - k. Install the DVES in the workroom adjacent to the digital Creation/Production area of the Media Center.
2. The Digital Video Encoding Station shall be supplied by ETR, or be a pre-approved equal.

2.04 MEDIA SERVER ADMINISTRATOR SOFTWARE

- A. The MediaAdministrator software shall consist of, but not be limited to the following:
1. Web accessibility via every major browser.
 2. The MediaAdministrator software shall provide a graphical representation of all administrative functions required by the Video On Demand system.
 3. The MediaAdministrator software shall provide password-protected access to the administrator functions. Only personnel with administrative permissions can access this software.
 4. The MediaAdministrator software shall be Web based.
 5. The Media Server Administrator shall provide for the following administrative functions:
 - a. Adding, deleting, and editing User information.
 - b. Adding, deleting, and editing media Title information.
 - c. Adding, deleting, and editing scheduled Event information.
 - d. Adding, deleting, and editing Room information.
 - e. Adding, deleting, and editing playback Source information.
 - f. Adding, deleting, and editing Channel information.
 - g. Adding, deleting, and editing IP Stream information.
 6. The MediaAdministrator software shall provide Zone Page functions. Zone paging is defined as the ability for Media Administrators to selectively power on and off TVs and projectors in the LAN, WAN, MAN, and Internet environment. The Zone Paging function shall have the following minimum functions:
 - a. Create and edit an unlimited amount of zones.

- b. Display the current status of every TV and projector in every zone. Media Server Administrator software will poll and receive status from networked plasma/LCD TVs and projectors. The software will then display a Gray TV for Off, a Blue TV if On, and a Red TV if there is a communication problem.
 - c. Allow individual control of any classroom TV with the Media Server Administrator software. This includes, Power, Volume, Channel, Mute and Input source control.
 - d. The software shall be capable of manually selecting any zone, selecting a channel for the video zone page, and turning TVs on for the duration of the broadcast. TVs that were off prior to the video page will turn back off following the page. TVs that were on prior to the page will remain on and return to original channel being viewed.
 - e. Using the Media Administrator software, the system shall be capable of prescheduling a zone page. This function shall include scheduling the TV to turn on and off, selecting the appropriate channel for the TV in that zone, and scheduling any required sources (i.e. VCR, DVD, LDP) to automatically run. TVs that were off prior to the rescheduled video page will turn back off following the page. TVs that were on prior to the prescheduled video page will remain on and return to original channel being viewed.
 - f. The Media Administrator software automatically polls projectors for projector lamps burn time for and dynamically creates a maintenance log.
 - g. The Media Administrator software, in conjunction with the ACI, shall be capable of displaying the status of a motion detector (PIR) from the ACI. The Programming on demand Administrator software shall then be capable of sending a message to an addressable security system that motion in that room location was detected.
7. The System tab allows the Media Server Administrator to Import MARC 21 library format files from most library systems. The Load MARC Record function allows the user to add to the end of the title database or to overwrite the existing title database.
 8. The Period tab allows the Media Server Administrator to define the beginning and end of an unlimited quantity of school periods. Defining periods allows teachers using Media Scheduler to schedule by period. Or, the District may prefer to schedule by time, which the system allows.
 9. The Channels tab allows the Media Server Administrator to build a complete channel lineup. Only the preferred channels are identified, assigned a channel number or IP stream address, assigned a channel icon from a built in database of national logos, or downloaded from a remote database. Once the Channel is fully defined, Media Controller users simply point and click on the History Channel icon and the TV tunes to the appropriate channel or stream. Teachers who travel from outside the District need not be familiar with the numerical channel lineup, they simply click the familiar icon of the channel they desire. Systems without icon based channel control require additional teacher training and are therefore deemed inferior.
 10. The Sessions tab allows the Media Server Administrator to view all users logged into MediaMaster. The Administrator can have a snapshot of what every teacher is doing, and can disconnect any user from the system if required.
 11. The Sources tab allows the Media Server Administrator to define what analog and digital playback sources teachers using Media Controller can control, and to what extent. Buttons can be added or deleted based on capability of the playback source, or by what permissions the District allows. For example, a DVD could include a power button, but if teachers shut off the DVD it would cause conflict with the next scheduled teacher. Thus, the Power button would not be added to the Source palate. Record is a capability of VCRs, but if added and selected by a teacher, could erase a tape.

12. Media Server Administrator also allows configuration of DVD players for Advanced DVD Control. Newer DVDs are starting to feature chapter, frame, language, menu, etc. selections. Systems without Advanced DVD Control preclude teachers from using many educational DVDs that are now provided with Laser Disk like features, and are therefore deemed inferior.
13. The System tab allows the Media Server Administrator to automatically force TVs and projectors off at a predefined time, and keep them off. This feature is primarily used for energy conservation and prolonging projector lamp life, but also serves to prevent evening occupants from watching TV for non-educational purposes.
14. The Media Server Administrator Software shall be supplied by ETR, or be a pre-approved equal.

2.05 MEDIA CONTROLLER SOFTWARE

- A. The Media controller software shall minimally consist of:
1. Web accessibility via every major browser.
 2. The Media controller software must be extremely user-friendly for instructors. Software that is not intuitive would increase the District's staff training costs and is not acceptable.
 3. The Media controller software shall provide a graphical representation of all digital, analog, CATV, Bulletin Boards, and local origination broadcast resources to an instructor on one or many PCs and Macs in the classroom.
 4. The Media controller software shall communicate with all other components in the system via TCP/IP over the LAN or WAN installed by others.
 5. The Media controller software shall provide password-protected access to the administrator functions. Only personnel with teacher or administrative permissions can access this software.
 6. The Media controller software shall not require installation of additional plug ins or interpreters as a prerequisite for operation. This would increase the District's support costs and is not acceptable.
 7. Systems which require additional and direct cabling to the ACI (set top box), are unacceptable.
 8. The Media controller software shall use asynchronous messaging and must graphically display system changes as they occur. For example: Ms Smith in room 100 is logged in to the Controller screen and would like to use a VCR. While she is deciding Mr. Jones logs in as room 102 and selects VCR2 for use. Ms. Smith immediately sees an in-use "sticky note" placed on VCR2. The sticky note also informs Ms. Smith that it was Mr. Jones who selected the VCR for use.
 9. Systems which periodically poll for system update and status information, are not acceptable.
 10. The Media controller software shall provide graphical icons for each of the major cable TV channels and IP streams available to the instructor.
 11. The Media controller software shall control all TV and projector functions including Power On/Off, Volume Up/Down, Mute, Channel Up/Down, switch AV inputs, disable TV buttons.
 12. Upon logging in to the Media controller software, the instructor shall be given immediate control of all sources scheduled for the current time period.
 13. To facilitate perpetual training requirements, a full featured web demo of Media controller software must be available to the District's entire staff 24 hours a day, 365 days a year.
 14. The Media controller Software product shall be supplied by ETR, or be a pre-approved equal.

2.06 MEDIA SCHEDULER SOFTWARE

- A. The Media scheduler software shall minimally consist of:
1. Web accessibility via every major browser.
 2. The Media scheduler software must be extremely user-friendly for instructors. Software that is not intuitive would increase the District's staff training costs and is not acceptable.
 3. The Media scheduler software shall provide instructors a graphical representation of all available digital and analog media.
 4. The Media scheduler software shall communicate with all other components in the system via TCP/IP over the LAN or WAN.
 5. The Media scheduler software shall provide password-protected access to all media resources. Only personnel with teacher or administrative permissions can access this software.
 6. The Media scheduler software shall not require installation of additional plug ins or interpreters as a prerequisite for operation. This would increase the District's support costs and is not acceptable.
 7. The Media scheduler software shall use asynchronous messaging and must graphically display system changes as they occur. For example: Ms Smith in room 100 is logged in to the Scheduler screen and would like to schedule a Title from the Title database. While she is deciding Mr. Jones logs in as room 102 and schedules the same title. Ms Smith immediately sees a graphical representation of when and where Mr. Jones has scheduled the title.
 8. Systems which periodically poll for system update and status information, are not acceptable.
 9. The Media scheduler software shall support access to other Media Title Databases available on the LAN, the WAN or via the Internet.
 10. The Media scheduler Software product shall be supplied by ETR, or be a pre-approved equal.

2.07 MEDIA MENU CHANNEL

- A. The independent Media Menu channel shall be continuously broadcast District wide via the video distribution system to provide teachers and students accurate information about video broadcasts. The scrolling menu channel is a NTSC representation of the most current video schedule.
- B. The graphically based Media Menu channel shall be automatically produced by the Media Server and shall not require human intervention.
- C. The graphically based Media Menu channel shall be automatically produced by the Media Server and shall not require human intervention.
- D. The Media Server shall be equipped for an NTSC broadcast output inclusive of a video/audio modulator (above #100), video and audio cables, control cables, and factory installed in the Video Router. Provide software, processors, combiners, amplifiers, fiber converters, etc, as required, to provide a "turn key" installation.
- E. A Media Menu channel icon shall appear on every client copy of Media Controller Browser software. When the teacher selects the menu channel icon, the tuner in TV monitor changes to the appropriate channel and the ACI clearly displays MENU.

- F. The Media Menu channel shall be the software factory installed product as supplied by ETR, or pre-approved equal.

2.08 MEDIA PLAYLIST BROWSER SOFTWARE

- A. The optional Media Playlist Browser Software shall consist of, but not be limited to the following:
1. Playlist allows the Video On Demand System to function as an automated broadcast system. Any zone of TVs to be turned ON, tuned to a Bulletin Board or CATV channel, or play an MPEG title from the Digital Video Server. The amount of zones is unlimited. The amount of TVs in any zones is unlimited. Zones are easily created and TVs added by simply clicking on them.
 2. The Playlist is a pre-programmed automated event that can occur one time, or repeat as many times as desired, at any time. When the Playlist event is finished TVs are returned to their state prior to the automated Playlist event. Multiple Playlist events can be pre-scheduled.
 3. Typical daily Playlist events include Bulletin Board, Weather Channel, News Channel broadcasts to Lobbies, Cafeterias, and other common spaces. Recurring events such as The District's Morning News Broadcast can be pre-encoded and auto-play during the pre-scheduled Playlist event.
 4. Special events such as playing a requested digital title on the Cafeteria TVs for the Boy Scouts between 7:00PM and 8:00PM can be easily accommodated without media personnel present.
 5. The Media Playlist Browser software shall provide password-protected access to the administrator functions. Only personnel with administrative permissions can access this software.
 6. The Media Playlist Browser software shall NOT require additional browsers or interpreters to be installed as a prerequisite for operation.
 7. The Media Playlist Browser software shall use asynchronous messaging and must graphically display system changes as they occur. Systems, which periodically poll for system update and status information, are not acceptable.
 8. The Media Playlist Browser software shall support access to other Media Title Databases available on the LAN, the WAN or via the Internet.
 9. The user-friendly Media Playlist Browser software shall be the Media Playlist product as supplied by ETR, or pre-approved equal.

2.09 MEDIA CONTROL MODULE (MCM)

- A. The purpose of the MCM is to allow global control of multiple video source sites in a District wide WAN Video-on-Demand system, without adding or maintaining multiple servers. The MCM shall consist of, but not be limited to the following:
1. The MCM shall have (8) eight Infrared output ports for controlling Video playback devices such as VCRs, DVDs, etc.
 2. The MCM shall be locatable anywhere on the WAN/LAN. The MCM shall function as an Ethernet Network Interface Card (NIC) allowing local and remote control of infrared video playback sources. Each MCM shall have a unique IP address for identity on the network.
 3. The communication protocol between the MCM and Video On Demand Server shall be TCP/IP.
 4. The MCM shall have a standard 10BaseT connector for connectivity to the LAN/WAN. The 10BaseT connector shall have a Link status light and a Transmit Data light.

5. Each MCM shall have the ability to learn IR control commands or accept downloaded command sets from the Programming on demand Server. Devices, which require a separate or master IR learner box or device shall be unacceptable.
6. The MCM shall have an RS-232 port which can be used for local control, local diagnostics, local IR learning and local monitoring.
7. The MCM shall include graphical Windows based configuration and diagnostic utility software. Systems, which use character based configuration utilities, will be unacceptable.
8. The MCM microprocessor, real time clock and battery shall be self-contained on a 72 pin SIMM for quick and simple field servicing.
9. The MCM TCP/IP protocol stack shall support standard network diagnostic functions such as PING.
10. The MCM IP address shall be assigned from the Media Server. Systems, which use a dedicated device name, as an addressing scheme shall be unacceptable.
11. The Media Control Module shall be the Programming on demand product as Supplied by Vender, or pre-approved equal.

2.10 SERIAL PORT EXPANDER (SPES)

- A. The SPES shall consist of, but not be limited to the following:
1. The SPES-8 and 16 are Ethernet based terminal servers for installation in wire closets to provide 8 or 16 serial communication ports for compatible RS232 plasma TVs, LCD TVs, projectors and TV tuners. The SPES allows the Media server to communicate to multiple serial TVs, projectors, and tuners via CAT3, CAT5, or CAT6 cables provided by the Structured Cabling Contractor. The SPES requires one 100Mb Ethernet port supplied by others, and preferably configured as a VOD System VLAN.
 2. The SPES-1 is a single port Ethernet to serial converter that allows the Media server to communicate to a single serial compatible TV or projector. It connects between a live 10Mb or 100Mb Ethernet wall jack and the RS232 control port of ETR approved compatible TVs and projectors. The SPES-1 serves sections of building with sparsely located TVs and projectors. Or, for retrofits projects that require single serial ports, the SPES-1 is a sensible solution. In building sections requiring higher density of serial control ports, the SPES-8 or 16 port versions may be more cost effective.
 3. The SPES-2 is a unique dual port Ethernet to serial converter that allows the Media server to simultaneously communicate to a compatible RS232 projector and RS232 TV tuner. It connects between one live 10Mb or 100Mb Ethernet wall jack and the RS232 control port of ETR approved compatible projectors and TV tuners. The SPES-2 serves sections of building with sparsely located projector/TV tuners. In building sections requiring higher density of serial control ports, the SPES-8 or 16 port versions may be more cost effective.
 4. The SPES-SB is also available as a multi-port serial expansion board installed in the Media server to control RS232 Laser Disk and DVD players.
 5. Systems that do not support remote terminal servers on the WAN/LAN, are unacceptable.
 6. The serial port expander shall be the SPES product line as Supplied by ETR, or pre-approved equal.

2.11 UNINTERRUPTIBLE POWER SUPPLY (UPS)

- A. Provide a full time, on-line UPS system providing sine wave correction, voltage regulation, spike suppression, and a minimum of 20 minutes backup power. Standby UPS systems are not acceptable.
- B. The UPS must be capable of interfacing to the Media Server and Digital Video Server with an alarm function to enable an orderly shut down prior to complete loss of power.
- C. Provide UPS system similar to manufactured by Para Systems, Liebert, Sola, Triplite, or Best for Video system intelligent equipment.

3.01 DEMONSTRATION

- A. Owner's Training: Provide minimum 24 hours of training for Owner's personnel per building (48 total hours) used at Owner's sole discretion and scheduled by Owner to fit Owner's needs.
 - 1. Training scheduled by Owner in blocks of 4-8 hours.
 - 2. Include all per diem, travel costs, etc., in cost of training.
 - 3. Begin training after Engineer deems system physically complete and fully operation. Service time not deemed as training.
 - 4. Include following minimum content in training:
 - a. General systems overview describing sub-systems and their relationships with each other.
 - b. Specifics on sub-systems and how to maintain them to ensure reliable operations.
 - c. Operation of equipment to perform intended tasks, including (but not limited to) remote origination, camera operation, television operation, cable patching, fuse replacement and so forth.
 - d. Provide written documentation for all training attendees to supplement training (i.e. diagrams, training outlines/highlights, etc.)

TESTING AND TRAINING:

- A. Prior to connection of any terminal equipment all cables shall be tested as per FIEA spec. PC-4. Cables shall be tested for Opens, Splits, Crossed Pairs, Shorts to Ground and Shield Continuity. All defective cabling is to be replaced prior to device hook-up.
- B. Upon completion of the installation the contractor shall test each room station speaker, handset or call switch for proper operation All telephones, programming and functions are to be tested for proper operation. All emergency and program functions are to be tested. the Contractor shall conduct a functional system test in the presence of the Owner and his representatives. The Contractor shall prepare and submit a written test plan that will demonstrate the system's operation, critical component operation, and software feature set functionality. A Contractor's punch list of problems shall be generated. The Contractor shall make all necessary modifications and/or adjustments of the punch list items. Following corrections the Contractor shall repeat any system test necessary to satisfy the Owner of the system's compliance with the specifications. Any malfunction shall be corrected prior to final acceptance.
- C. A minimum of sixteen hours time shall be included in the bid for instruction of the Owner's personnel in proper operation and routine maintenance of the system. Instruction shall cover all materials indicated in the Owners and operations manual.

- D. Operational guidelines shall be given in written form in sufficient numbers so that all key personnel have operational instructions for programming, station use and special features. Copies of these instructions shall be provided for permanent record in the operations and maintenance manuals.

WARRANTY:

Contractor shall provide one year warranty of all systems against defects in material and workmanship. All labor and materials shall be provided at no expense to the Owner and shall be provided during normal working hours. The warranty period shall begin on the date of acceptance by the Owner.

END OF SECTION

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

PART 1: GENERAL

SCOPE OF WORK:

This document provides specifications to be used in conjunction with network design drawings for installation of voice and for data cabling.

The Contractor shall furnish all labor, materials, tools, equipment and services necessary for and reasonably incidental to installation of specific voice and/or data cabling communications infrastructure. Work shall include all components for both a voice and data horizontal and riser cable plant from workstation outlet termination to wire closet termination. All cable plant components such as outlets, wiring termination blocks, racks, patch cables, etc. will be furnished, installed, and tested by the Contractor. The data cable plant is designed to support a 10BASE-T Ethernet building-wide computer network.

The scope of work includes all activities needed to complete the wiring and network intelligent hub equipment installation described in this document and the drawings.

The successful Bidder must be able to provide and install new equipment and materials in compliance with specifications contained in this document and accompanying drawings.

Any and all overtime (outside school hours) required to complete the scope of work within the time frame specified shall be included in the quoted price.

VOICE AND DATA WIRING PLAN OVERVIEW:

The cable system is based on the universal cabling concept. The same cables are installed to all workstations; connectors, adapters, and interconnections determine how the cable operates.

COMMUNICATIONS DESIGN (CD) DRAWINGS:

Communications design drawings show voice and data CNO locations, cable routing, and wire closet layout plans.

WORK SCHEDULE:

The contractor will coordinate all work schedules with the Architect. All efforts should be made to complete cable installation prior to the installation of ceiling tile in new or modernized construction.

DEFINITIONS:

The term "Bidder" refers to those parties who are submitting proposals for the work set forth in this document. The term "Contractor" refers to the successful Bidder and to any work or issues after the award of the contract.

The term "Owner" refers to Pitt County Schools or its designated agent.

A "Communications Network Outlet" (CNO) refers to a specific communications termination location with "two or four port communications outlet", defined as a CNO containing 2 or 4 modular RJ-45 connectors. A "jack" refers to one modular RJ-45 connector. A "faceplate" is a decorative cover that covers the non-exposed portion of the jack and attaches to the outlet.

“Riser” refers to the cables interconnecting the wiring closets. Please note that in most cases the riser cables are physically a horizontal run between two closets.

GENERAL REFERENCE STANDARDS:

The installation shall comply with the following:

1. National Fire Protection Agency (NFPA) No.70, National Electric Code 2005 Edition
2. State and Local Building codes
3. National Fire Protection Agency (NFPA) No. 101, Life Safety Code, latest edition.
4. TIA/EIA 568A, 568B, 606, 607, and 569.
5. Building Industry Consulting Service International's (BICSI) Telecommunications Distribution Methods Manual

CONSTRUCTION SUBMITTAL:

In addition to the submittal requirements the Contractor must submit the following information during the execution of the project.

1. The Contractor must submit the manufacturer and model number for all suggested substitution of equipment specified for the work contracted. The Owner will determine acceptability of equipment at their discretion. For all cable components, the Owner will require certification that components are accepted for use in Ethernet networks, and meet all specifications as described.
2. The Contractor shall submit for approval samples of voice and data cable, fiber optic cable, patch cords, patch panels, faceplates and jacks. Samples shall be returned upon written request. The Owner shall have the right to reject any submittal that does not meet the specifications and intended use as determined by Owner.
3. Shop drawings showing proposed cable routing, closet detail design, rack design, MDF layout and other design details not specified in this document or Communications Design Drawings shall be submitted prior to any portion of the system installation for approval and to demonstrate compliance with the contract documents. Any departures from the original contract drawings should show details of such departures including changes in related portions of the project and the reasons therefore submitted with the shop drawings. Shop drawings must be provided showing details of all proposed fire-stops for four-hour rated walls. Approved departures recommended by the Contractor shall be made at no additional cost to Owner or shall result in a net decrease in cost. The Owner shall obtain the benefits of any cost reductions of these changes.
4. The Contractor shall submit as-built design drawings of the installed cable system including any design which deviates from the specified routes. As-built drawings shall include cable routes and labeling, patch panel configurations, IDC and MDF configurations, cross connect details, riser system, patch cord details, riser system, fiber storage and labeling. As-builts shall be turned over to the Owner as each section of the work is completed.

PART 2: PRODUCTS

STANDARD FOR MATERIALS:

Furnish and install new and undamaged materials conforming to the applicable standard. The standards and publications of the following entities and applicable to materials specified herein:

1. Underwriters Laboratories (UL)
2. Institute of Electrical and Electronic Engineers (IEEE)
3. American National Standards Institute (ANSI)
4. Electronics Industry Association (EIA)
5. Telecommunications Industry Association
6. Electronics Testing Laboratories, Inc. (ETL)

Materials referenced by manufacturer or trade name are cited for the quality of the product and are not intended to limit competitive bidding. The Bidder, at their option, may bid to furnish alternative products which are equal in quality and performance; however, all substitutions must be approved by Owner.

COMPLETENESS OF WORK:

Furnish all material, labor, transportation, tools, equipment, and supervision to install and leave ready for operation a complete communications systems in accordance with these specifications and the accompanying drawings.

All offsets, bends fittings pull boxes, stems and supports for the complete installation are not indicated on the drawings. It shall be the Contractor's responsibility to furnish and install all offsets, bends, devices, raceway supports, and equipment for the complete installation.

COMPATIBILITY:

Provide products which are compatible with other components in the system with which they must interface. Components and materials must fit into the confines indicated, leaving adequate clearance as required by applicable codes or manufacturer for adjustment, repair, or replacement.

PRODUCT HANDLING, DELIVERY, STORAGE:

Ensure that all system equipment, devices, and materials arrive at the designated installation site in good condition, intact in factory package or crate. Any equipment found to be damaged will be removed from the project site and will be replaced by the Contractor at their expense.

Storage - Store all equipment, devices and materials in their factory containers or package until ready for use. Storage facilities will be a clean, dry and indoor space which provides protection against the weather. Avoid damage by condensation by providing temporary heating when required. Large reels of cable may be stored outdoors provided there is adequate protection from physical damage and the cable ends are properly sealed to prevent moisture ingress. The Bidder shall state how much space and floor loading will

be required. Storage related costs will be the responsibility of the Contractor. Coordinate all storage of materials and equipment with the Owner.

Handling - Handle all equipment, devices and materials carefully to prevent breakage, denting or scoring of the finish or cable jackets. Damaged materials will be removed from the project site, and replaced by the Contractor at no additional cost. No sheath cuts will be accepted. All cables must be installed with sheath intact to the point of termination.

The Bidders should note that strict limitations will be enforced on the size, weight, and arrangement of cable reels. In general, cable reels must be of a size to be lifted on the interior freight elevator, and fit through standard doorways.

Any cable found to be damaged or defective shall be replaced by the Contractor at no additional cost to the Owner.

DATA CABLE INFRASTRUCTURE

A. Twisted Pair Cable

1. Cabling shall be unshielded twisted pair (UTP) and shall meet EIA/TIA-568, TSB-36 requirements for Category 6. Provide UTP cable with the following minimum features:
 - a. Conductors: 24 AWG solid copper, 4 pair;
 - b. Impedance: 100 ohms +/-15% at 1-100 MHz;
 - c. DC Resistance: 25.7 ohms/1000 ft. maximum at 20 degrees C;
 - d. Mutual Capacitance: 14 pF/ft. nominal at 1 MHz;
 - e. Attenuation (per 1000 ft):
 - i. 2.0 dB at 1 MHz
 - ii. 3.7 dB at 4 MHz
 - iii. 6.0 dB at 10 MHz
 - iv. 7.6 dB at 16 MHz
 - v. 8.6 dB at 20 MHz
 - vi. 10.8 dB at 31.25 MHz
 - vii. 15.5 dB at 62.5 MHz
 - viii. 20.2 dB at 100 MHz
 - ix. 25.8 dB at 155 MHz
 - x. 29.8 dB at 200 MHz
 - xi. 41.2 dB at 300 MHz

2. Provide one "homerun" UTP cable between each data outlet port indicated on the drawings and the appropriate Local 100/1000 Switch
3. UTP cables shall not exceed 90 meters from the data outlet port to the appropriate 100/1000 Switch

B. Fiber Optic Cable

1. Provide fiber optic cabling with the following features:
 - a. Glass type shall be laser enhanced 50 micron core;
 - b. Glass cladding shall be 125 micron;
 - c. Glass type shall be multi-mode;
 - d. Short term Tensile strength of 200 Lbs. or less
 - e. Maximum attenuation at 850/1300 nm shall be 3/1 dB/Km;
 - f. Minimum bandwidth at 850/1300 nm shall be 1500/500 MHz-km.
 - g. Each cable shall have a minimum short term bend radius of 10X the cable diameter;
2. In-field splicing of fiber optic cables shall not be permitted.
3. Provide twelve (12) fiber optic strands between each IDF and the MDF
4. The 2011 National Electric Code Type OFNP specification shall be considered when fiber optic cables are installed, without benefit of adequate raceway, in a plenum air return.
5. OFNR rated fiber optic cables shall be Corning, Siecor or equivalent.

C. Fiber Optic Connectors

1. Provide Fiber Optic connectors with the following features:
 - a. Connectors shall be SC compatible, multi-mode type;
 - b. Connector tip material shall be ceramic;
 - c. Connectors shall accept a maximum fiber jacket diameter of 3.0 mm;
 - d. Connectors shall be spring loaded, bayonet style for a positive contact;
 - e. Connectors shall be keyed to prevent rotation after insertion;
 - f. Connectors shall utilize cured adhesive methods for assembly;
 - g. Attenuation through connectors shall be less than .3 dB;
 - h. Epoxy-less, mechanical crimp-style fiber optic connectors are not acceptable;
2. Fiber Optic connectors shall be ATT P2020C-C-125, Siecor 95-100-01 or equivalent.

D. Data Station Outlet

1. Face plates

- a. Provide Data Station Outlets as indicated on the drawings with the following features:
 - i. Single gang, flush mountable, almond colored plastic construction;
 - ii. Shall accept data, telephone, fiber optic, VGA, video, audio and blank insert modules;
 - iii. Shall have the capability to accept up to six individual ports;
 - iv. Inserts shall snap in and out from the front of the Data Station Outlet;
 - v. Face plates shall be supplied with pressure-sensitive icon labels;

2. Inserts

- a. Provide Data Port inserts with the following features:
 - i. RJ-45 type rated for Category 6;
 - ii. RJ-45 insert shall be configured to EIA-568A wiring standards;
 - iii. Attenuation through the RJ-45 port at 10/16 MHz shall be less than .015/.025 dB;
 - iv. Provide 110 style IDC terminations for all eight conductors of a UTP cable;
- b. Provide Telephone Inserts with the following features:
 - i. RJ-45 type rated for Category 6;
 - ii. RJ-45 insert shall be configured to USOC wiring standards;
 - iii. Provide 110 style IDC terminations for all six conductors of a UTP phone cable;
- c. Provide VGA inserts with the following features:
 - i. DE-15, 15 pin connector; cable manufacturers typical of Rapid Run or equal shall be used to permit run within raceways.
- d. Provide Video inserts with the following features:
 - i. RCA type connector, panel mount to solder termination;
 - ii. Video inserts shall be Switchcraft 3501FP, or equivalent.
- e. Provide Audio inserts with the following features:
 - i. RCA type connector, panel mount to solder termination;
 - ii. Audio inserts shall be Switchcraft 3501FP, or equivalent.

3. In addition to the data ports shown on the drawings, provide data ports at all teachers panels and at all TV locations.

E. Patch Panels

1. Patch panels shall be provided at each IDF and MDF for termination of all UTP and fiber optic cables. Patch panels shall have the following features:
 2. Patch Panels for Twisted Pair Cable
 - a. MDF panels shall be mountable in EIA standard 19" equipment racks;
 - b. MDF panels shall be rated for Category 6;
 - c. Each panel shall provide a minimum of twenty-four RJ-45 ports in one rack space position (1RU);
 - d. Each RJ-45 port shall provide 110 style IDC terminations for all eight conductors of a UTP cable;
 - e. RJ-45 ports shall be configured to EIA-568A wiring standards;
 - f. Attenuation through the RJ-45 port at 10/16 MHz shall be .015/.025 dB;
 - g. MDF panel, provide one RJ-45 port for each data station outlet port and each vertical riser cable, plus 20% percent for future expansion;
 - h. Clearly label each patch point with the location of its associated data station port;
 3. Provide a three (3) foot minimum Category 6 UTP patch cable for every Category 6 UTP data cable terminated at a patch panel. Install and neatly route patch cables between the panel and the hubs utilizing cable management hardware.
 4. Patch Panels for Fiber Optic Cables
 - a. IDF and MDF panels shall be mountable in EIA standard 19" equipment racks;
 - b. IDF and MDF panels shall provide SC-SC feed-through connectors for termination of fiber optic strands;
 - c. IDF and MDF panels shall provide space for at least three feet of fiber optic cable management and excess patch cable storage in a pull-out drawer;
 - d. Clearly label each fiber optic SC patch position with the location of its origin;
 - e. MDF panels shall be capable of terminating a minimum of (72) Seventy-two fiber optic cable strands;
 5. Provide a 6-foot minimum fiber optic patch cable for ever fiber hub or switch port in the system. Install and neatly route patch cables between the panel and the hubs, utilizing cable management hardware.

6. Provide horizontal cable management panels between each patch panel for twisted pair cable and vertical cable management panels for each data rack. Cable management panels shall be Panduit "WMP" series, or equal.
 7. Provide fiber management systems at The MDF location.
- F. Ethernet Switch at the MDF and at IDF Locations or as shown on the drawings
- G. Certification
1. Systems Contractor shall be factory certified to install the Data Cabling Infrastructure. The Systems Contractor shall include a copy of the factory-provided certification with his submittal.

PART 3: EXECUTION

Perform the work in accordance with acknowledged industry and professional standards and practices, and the procedures specified herein. Furnish and install all materials, devices, components, and equipment for complete operational systems.

DEVIATIONS:

No deviations shall be made from the drawings or specifications. Should the Contractor find at any time during the progress of the work, that in his judgement, conditions made desirable or necessary modifications in the requirements covering any particular item or items, he shall report such matters promptly to the Owner for his decision and instruction.

COOPERATION BETWEEN TRADES:

The communications work shall be scheduled with the work of the other trades to avoid delays, interference's, and unnecessary work. All other shall be notified of all openings, hangers, excavations and similar operations for the installation of communications work, is required under this section of the specifications. The work of other trades shall not be cut without first consulting the Owner. Any work damaged by those employed in the work under this section of the specifications shall be repaired using the services of the trade whose work is damaged at the cost of the Contractor.

The plans are diagrammatic and reference must be made to structural, architectural, and mechanical systems plans and actual construction. Work under this section shall be coordinated with the different trades so that interference between electrical raceways, piping, equipment, architectural, and structural work shall be avoided.

Clearly and completely specify all items and actions relative to the installation and operation of the proposed equipment that the Owner will be responsible for providing and/or performing.

The successful Bidder's project manager will be responsible for providing written reports to the Owner at the beginning of every week for the previous week's work completed and upcoming week's planned. Maintain a competent supervisor and supporting technical personnel, acceptable to the Owner, during the entire installation. Change of the supervisor during the project shall not be acceptable without prior written approval from the Architects.

Dress and permanently label all cables at each end using approved labels to ensure a neat and organized appearance.

Do not splice or otherwise re-terminate any cable used to fulfill the requirements of this specification other than at the main distribution frame and intermediate distribution cabinet. Riser cables will not contain intermediate splices.

Coordinate work with any other communications parties on-site, specifically, the LAN Installer, the Computer Installer, and other third parties whose work may affect or be affected by the cabling systems described herein.

During installation, the Owner and/or Representative will conduct periodic inspections to verify that cable installation is proceeding according to the guidelines specified in this document. Any deficiencies found will be properly corrected within 7 days by the Contractor at no additional expense to the Owner upon notification to the Contractor.

It is expected that overtime may be required to complete the scope of work in the time allocated. The Bidder must include all overtime in his price and no additional overtime charges will be accepted.

The Contractor will control litter at all times by keeping it in containers. The Contractor will remove any installation debris from the site and dispose of it properly. Major trash will be removed daily by the Contractor. All other cable-related trash, dust, dirt, etc. must be removed and cleaned prior to acceptance.

INSTALLATION OF SYSTEMS

A. Device Locations

Locate all apparatus requiring adjustments, cleaning, or similar attention so that is shall be accessible for such attention. Equipment racks shall be positioned to permit full access for operation and service.

B. Blank and Custom Panels

Finish of blank panels and custom assembly panels shall match adjacent equipment panels as closely as possible.

C. Markings

Switches, connectors, jacks, receptacles, outlets, cables, and cable terminations shall be logically and permanently marked. Custom panel nomenclature shall be engraved, etched, or screened. Marking for these items are purposely detailed on the drawings to ensure consistency and clarity. Verify any changes in working type size, and/or placement with the Architect prior to marking.

D. Environment

The equipment specified herein is designed to operate in environments of normal humidity, dust, and temperature. Protect equipment and related wiring during installation where extreme environmental conditions can occur.

ELECTRICAL POWER

A. Grounding

Review and coordinate electrical power system installation including grounding, with the Division 16 Prime Contractor to ensure proper operation of the system. All racks, cable tray, and devices shall be grounded to a common isolated grounding bar within each MDF or IDF. Additional grounding shall be installed where directed by the engineer.

B. Verification

Verify that all AC power circuits designated for the system are properly wired, phased, and grounded. Report in writing any discrepancies found to the Division 16 Prime Contractor for corrective action.

C. Equipment Rack

Provide distribution of electrical power within the equipment racks with a minimum of two spare AC receptacles per branch circuit, used in the racks.

CLEANING

Clean all junction and terminal box interiors thoroughly before installing plates, panels, or covers.

WIRING METHODS & PRACTICES

A. Identification

All wires shall be permanently identified at each wire by marking with "E-Z" tape marker or equivalent.

B. Terminal Blocks

All terminal block connections shall be readily accessible. Not more than two wires connected to one terminal. Spare terminal blocks, equivalent to 10% of those in actual use shall be provided.

C. Splicing

Splicing of cables shall not be permitted between terminations of specified equipment.

D. Pulling Cable

Do not pull wire or cable through any box fitting or enclosure where change of raceway alignment or direction occurs. Do not bend conductors to less than recommended radius. Employ temporary guides, sheaves, rollers, and other necessary items to protect cables from excess tension, abrasion, or damaging bending during installation.

E. Cable Tie

Form in a neat and orderly manner all conductors in enclosures and boxes, wire ways, and wiring troughs, providing circuit and conductor identification. Tie as required using T & B "Ty-Raps" (or equivalent) of appropriate size and type. Limit Spacing between ties to six inches and provide circuit and conductor identification at least once in each enclosure.

F. Service Loops

Provide ample service loops at each termination so that plates, panels, and equipment can be demounted for service and inspection.

G. Wiring Harnesses

1. All wires and cables used in assembling custom panels and equipment racks shall be formed into harnesses which are tied and supported in accordance with accepted Engineering practice.

2. Harnessed cables shall be formed in either a vertical or horizontal relationship to equipment, controls, components, or terminations.

EQUIPMENT RACKS

A. General

The equipment racks shall be considered as custom assemblies and shall be assembled, wired, and tested in a properly equipped shop maintained by the ICS Contractor. Assembly of racks on site shall not be permitted.

B. Equipment Location

Placement of equipment in equipment racks, as indicated in the drawings, is for maximum operator convenience. Verify any changes in placement prior to assembly. All system components and related wiring shall be located with due regard for the minimization of induced electromagnetic and electrostatics noise, for the minimization of wiring length, for proper ventilation, and to provide reasonable safety and convenience for the operator.

C. Rack Installation

Racks shall be installed plumb and square without twists in the frames or variations in level between adjacent racks.

D. Identification

All terminal blocks, rack mounted equipment, and active slots of card frame systems shall be clearly and logically labeled as to their function, circuit, or system as appropriate. Labeling on manufactured equipment shall be engraved plastic laminate with white lettering on black or dark background that is similar to panel finish.

PART 4: TESTING

TOOLS AND TEST EQUIPMENT

The Contractor will provide all tools and test equipment required for installation and testing work. Test equipment will be maintained in accurate calibration and will display the dates of the last calibration and next scheduled calibration. The Contractor is responsible for performing all tests indicated at the end of each section.

For all tests, the Owner or its agent must be present at the beginning of testing and at such times as the owner deems appropriate. The Contractor shall be responsible for correcting any problems or defects discovered during testing.

DATA CABLE INFRASTRUCTURE TESTING

1. Test each twisted pair cable segment (example: from the data station port through the patch bay and patch cable to the hub port connector). Publish a log of each test to verify that the cable segment passes the EIA/TIA-568 TEB-36 requirements for Category 6 compliance. Bind the test log in a booklet and turn the booklet over to the Owner. The test shall include:
 - a. Connector/cable continuity – line mapping;

- b. Cable segment length;
 - c. Dual near end cross talk (NEXT);
 - d. Attenuation at 100 MHz;
 - e. Attenuation per foot;
 - f. Pass/fail results of each portion of the test above.
2. Test each fiber optic strand segment (From each classroom or switch location to the MDF). Publish a log of each test to verify that the fiber segment passes the EIA/TIA-526-14 optical power loss measurement test. Bind the test log in a booklet and turn the booklet over to the Owner.

PART 5: COMMISSIONING

SYSTEM DOCUMENTATION

- A. Prior to final acceptance tests, submit to the Architect, three copies of an operating and maintenance manual for the system that has been installed. These manuals shall be used during the final acceptance testing of the system. Each manual shall contain the following information:
 1. As-built drawings
 2. Operations and maintenance manuals
 3. Single line diagrams showing levels throughout system and impedances

ACCEPTANCE TESTING

- A. The Acceptance Testing shall be performed by the Owner or the Owner's agent. Coordinate this period so that free access, work lighting, and electrical power is available on the site.
- B. Be prepared to verify the performance of any portion of the ICS system by demonstration, listening and viewing tests, and instrumented measurements.
- C. Make additional mechanical and electrical adjustments within the scope of work and which are deemed necessary by the Owner as a result of the acceptance test.

See also Specification Section 17900: Tests, Commissioning and Project Closeout

END OF SECTION

RELATED DOCUMENTS:

The general provisions of the Contract, including General and Supplementary Conditions, and General Requirements, and Division 1 specifications that apply to the work specified in this Section.

Part 1 – General

1.01 Additional Information

A. Refer to Section 17000 for the following Part 1 General information

- 1) References
- 2) Definitions / Terms / Acronyms
- 3) Submittal Requirements
- 4) Contractor Qualifications
- 5) Manufacturer Qualifications
- 6) Bidder Qualifications
- 7) Testing Agency Qualifications
- 8) Delivery, Storage and Protection
- 9) Project conditions
- 10) Sequencing
- 11) Continuity of Service and Scheduling of Work
- 12) Protection of Work and Property
- 13) Warranty

1.02 Products Installed but not Supplied Under This Section

- A. All conduit and EMT required for Communications cabling pathway in/out of cross connect closets and in/out of wall cavities at the work area. EMT or Conduit for pathways shall have no more than two 90 degree bends and no continuous section over 100'.
- B. All core holes and poke through devices in the floor for the installation of Communications cabling.
- C. All core holes and EMT sleeves between floors for the routing of Communications cabling.
- D. Basket tray or ladder racking to support main pathway cable bundles.

1.03 Backbone Cabling Description

- A. Backbone cabling system will provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in telecommunication rooms or at the entrance facilities.

1.04 Work Included

- A. The Work of this Section shall consist of the labor, materials and equipment required for furnishing and installing backbone cabling as part of a complete and operating telecommunications cabling system.

- B. All items specified or included in this section shall be furnished and installed by Telecommunications Contractor, wired and connected by Telecommunications Contractor and tested by Telecommunications Contractor, unless noted otherwise. "Contractor" as used herein shall mean Telecommunications Contractor or Telecommunications Contractor's sub-contractor.
- C. All items specified or included in this section shall be furnished and installed by Electrical Contractor, wired and connected by Electrical Contractor and tested by Electrical Contractor, unless noted otherwise. "Contractor" as used herein shall mean Electrical Contractor or Electrical Contractor's sub-contractor.

1.05 Submittals

- A. Submit for approval in accordance with specified submittal procedures:
- B. Components of the telecommunications system, as specified herein.

1.06 Coordination

- A. Contractor shall furnish and install the following:
 - 1) Inside plant copper backbone cables.
 - 2) Inside plant fiber optic backbone cables.
- B. Electrical Contractor shall furnish and install the following:
 - 1) Telecommunications raceways within the building.

Part 2 – Products

2.01 Multi-Pair Cables

- A. Multi-pair Cable Specification - Inside Plant, Category 3 25 pair
 - 1) Acceptable Manufacturer: Berk-Tek.
 - 2) Cable type: Category 3 CMR.
 - 3) Jacket Material: Fire retardant PVC
 - 4) Jacket Markings: Manufacturer's identification, pair count, wire AWG, sequential footage.
 - 5) Conductors: Solid 24 AWG copper
 - 6) Twisted pairs with varying lay lengths, quantity of pairs as indicated on Drawings.
 - 7) Conductor Insulation:
 - a. CMR – Polyolefin or PVC.
 - 8) Industry standard color coding, with colored binder tape for cable sizes greater than 25-pair.
 - 9) Jacket Color: White.

10) Electrical Characteristics: Meets TIA/EIA-568B requirements for Category 3 rated cables.

11) CMR rated cable suitable for installation in vertical risers and conduit.

2.02 Fiber Optic Cables

- A. Acceptable Manufacturer: Berk-Tek.
- B. Cable may be either of composite cable construction or standard cable containing single-mode fibers in one cable sheath and multi-mode fibers in a separate cable sheath. Contractor shall verify raceway fill requirements when furnishing and installing two standard cable constructions to meet composite strand count requirements.
- C. Fiber Cable Specification – Inside Plant, Riser 12 Strand 50 Micron, OM3
 - 1) Cable Construction:
 - a. Distribution type.
 - b. Individually jacketed bundles.
 - c. Central Strength Member:
 - i. Up to 24 strand: Aramid yarn.
 - 2) Jacket Material: Fire retardant PVC, OFNR rated.
 - 3) Fiber Count: 6 or 12 Strand as indicated on Drawings
 - 4) Fiber Type:
 - a. Multimode: 50/125 OM3
 - 5) 900 micron tight buffered fibers.
 - 6) Color Code: TIA/EIA-598-A, Optical Fiber Cable Color Coding.
 - 7) Jacket Color: Orange
 - 8) Maximum Pulling Tension:
 - a. Up to 12 strand: 660 N (148 lb/f) during installation, 198 N (45 lb/f) installed.
 - 9) Storage Temperature: -40 to +70 degrees C (-40 to +158 degrees F).
 - 10) Installation Temperature: -10 to +60 degrees C (+14 to +140 degrees F).
 - 11) Operating Temperature: -20 to +70 degrees C (-4 to +158 degrees F).
- D. Optical Fiber Performance Requirements (OSP and ISP fiber cables)
- E. Glass Transmission Media – Multimode 50/125
 - 1) Acceptable Manufacturer: Berk-Tek
 - 2) The multimode fiber shall meet EIA/TIA-492AAAC-A, "Detail Specification for 50- μ m Core Diameter/125- μ m Cladding Diameter, Graded-Index, Multimode Optical Fibers."
 - 3) 100 Kpsi Proof Tested
 - 4) Glass Geometry

- a. Core Diameter: (μm) 50 ± 2.5
- b. Core Non-Circularity: $< 5\%$
- c. Cladding Diameter: (μm) 125.0 ± 2.0
- d. Cladding Non-Circularity: (μm) $< 1.0\%$
- e. Core-to-Cladding Concentricity: (μm) < 1.5
- f. Numerical Aperture: 0.200 ± 0.015
- g. Coating Diameter: (μm) 245 ± 5
- h. Coating – Cladding Concentricity $< 12 \mu\text{m}$

5) Cabled Optical Fiber Performance

- a. Attenuation (dB/km): 850 nm < 3.0 , 1300 nm < 1.0
- b. Minimum LED Bandwidth: 850 nm, 1500; 1300 nm 500
- c. Cabled Effective Modal Bandwidth: (MHz•Km): 850 nm > 2000
- d. IEEE 802.3 GbE Distance (m): 850 nm, 1000; 1300 nm, 600
- e. IEEE 802.3 10GbE Distance (m): 850 nm, 300

F. Fiber Optic Cable Shipping Requirements

- 1) All cabled optical fibers > 1000 meters in length shall be 100% attenuation tested. The attenuation of each fiber shall be provided with each cable reel.
- 2) Top and bottom ends of the cable shall be available for testing on the shipping reel.
- 3) Both ends of the cable shall be sealed to prevent the ingress of moisture.
- 4) Each reel shall have a weather resistant reel tag attached identifying the reel and cable. The reel tag shall include the following information:
 - a. Cable Number, Gross Weight
 - b. Shipped Cable Length in Meters, Job Order Number
 - c. Manufacturer Product Number, Customer Order Number
 - d. Date Cable was Tested, Manufacturer Order Number
 - e. Cable Length Markings, Item Number
 - i Top (inside end of cable)
 - ii Bottom (outside end of cable)
- 5) Each cable shall be accompanied by a cable data sheet. The cable data sheet shall include the following information:
 - a. Manufacturer Cable Number, Manufacturer Product Number
 - b. Manufacturer Factory Order Number, Customer Name
 - c. Customer Purchase Order Number
 - d. Mark for Information Ordered Length
 - e. Maximum Billable Length, Actual Shipped Length
 - f. Measured Attenuation of Each Fiber Bandwidth Specification (for lengths > 1000 m)

- G. The cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification.

Part 3 – Execution

3.01 Installation

A. General

- 1) All cable and associated hardware shall be placed so as to make efficient use of available space in coordination with other uses. All cable and associated hardware

shall be placed so as to not impair the use or capacity of other building systems, equipment, or hardware placed by others (or existing).

- 2) Where cable is placed in ceiling areas or other non-exposed areas, cables shall be installed in cable trays or in non-continuous cable support system. Non-continuous cable supports shall be placed at random intervals no greater than 60 inches. Cables in non-continuous support systems shall be bundled using hook and loop type fasteners. Cable sag between supports shall not exceed 3 inches. Attaching wire to pipes or other mechanical items is not permitted. Cables shall not be bundled or tied in conduits, and in cable trays above ceilings.
- 3) All cabling shall be routed so as to avoid interference with any other service or system, operation, or maintenance purposes such as access boxes, network equipment, mechanical equipment access doors and covers, switches or electrical panels, and lighting fixtures. Avoid crossing areas horizontally just above or below any riser conduit. Lay and dress cables to allow other cables to enter the conduit/riser at a later time by maintaining a working distance from these openings. All cable shall be installed to allow for simple installation and removal of cables in the future.
- 4) Unless noted, all interior wiring shall be installed in raceways, Raceway Specification No. 2, one inch minimum. Wiring above accessible ceilings may be installed in cable tray and exposed on "J" hooks.
- 5) All cables not in raceways shall be riser or plenum rated.
- 6) All cables running outside the building shall be rated for outside plant installation.
- 7) Backbone cables shall be grouped separately from horizontal distribution cables. Cable for other systems shall be grouped separately from cables for telephone and data.
- 8) All inside cable shall be installed neatly above accessible ceilings using cable tray and "J" hooks supported from building structure. Do not attach to pipes, conduits, ducts, etc. Do not allow cable to rest on pipes, conduits, ducts, ceiling tiles, etc. Do not attach to wires used for supporting suspended ceilings. Do not use tie wires or bridle rings.
- 9) All wires shall be marked at all junction boxes, pull boxes, cabinets, boxes and terminations. Each cable run between terminating locations shall be one continuous cable (no splices or connections).
- 10) The Contractor shall install cable in such a manner as to prevent stretching, kinking or sharp bends. Cable damaged during installation or not passing required testing shall be removed and replaced at no additional cost to Owner.
- 11) The Contractor shall replace or rework cables showing evidence of improper handling including stretches, kinks, short radius bends, over tightened bindings, loosely twisted and over twisted pairs at terminations, and too much jacket removed.
- 12) Minimum bend radius and maximum pulling tension for all cables shall be maintained during and after installation. Install cable in accordance with manufacturer's ratings and instructions.
- 13) Cables shall not be installed near power sources or other items where interference could develop. Cables shall not be placed within 18 inches of light fixtures and within 3 feet of motors, transformers, copy machines, or solid state motor starters unless cable is installed in conduit. Contractor shall furnish and install a grounding conduit system where these minimum clearances cannot be maintained.

- 14) In telecommunications spaces, cables shall be routed as close as possible to the ceiling, floor, or corners to insure that adequate wall or backboard space is available for current and future equipment and for cable terminations. Cables shall not be tie-wrapped to existing electrical conduit or other equipment. Minimum bend radius shall be observed.
- 15) Dress and attach cables to the backboard along the shortest possible route run square (horizontal and vertical) to the backboard. Bundle similarly routed cables together and attach by means of clamps or distribution rings. Cable dress and attachment shall minimize obstruction to future installations of equipment, backboard, or other cables.
- 16) Cables shall be neatly bundled with hook and loop type fasteners. Nylon tire wraps are not acceptable. Cables must be neatly bundled in the telecommunications spaces and at the cable service loop.
- 17) Cable service loops shall be provided at both ends of backbone cable runs.
 - a. At the telecommunications room, provide a minimum 6 foot service loop stored in the cable tray above the racks/cabinets.
 - b. At the telecommunications room, provide sufficient slack to properly dress and terminate cables at the racks and cabinets.
 - i Provide sufficient slack so that swing gate type racks and cabinets can open fully
 - ii Provide sufficient slack so that cables do not catch or bind at swing gate type rack or cabinet hinge and the cables do not pull taught across the hinge or edge.
 - c. A minimum 25 foot service loop shall be maintained at each building entrance and exit.
- 18) All interior fiber optic cables shall be installed in riser rated innerduct above accessible ceilings.
 - a. Innerduct shall be installed to within 12 inches of termination enclosure.
 - b. Install pull boxes, 12" x 12" minimum, as required to limit cable pulls to two 90 degree bends or 150 feet.
 - c. Innerduct shall not be kinked or tightly bent in any way.
- 19) All exterior fiber optic cables shall be installed in innerduct.
- 20) A break-away link shall be used for installation of cables with a cable-puller or winch. The break-away link shall be designed to separate at or below the recommended maximum tension of the cable being installed.
- 21) Any damage to Owner's existing cabling or existing cable owned by others, caused as a result of work performed under this scope, shall be brought to the Owner's attention and repaired or replaced within 48 hours.
- 22) Contractor shall use only cable lubricants recommended by the manufacturer for use with the specific cable construction.
- 23) Should a cable become kinked, skinned or stretched during installation, the cable shall be removed and replaced at no additional cost to the Owner. Splicing at points other than those specified will not be acceptable.

3.02 Copper Cable Testing

A. Unshielded Twisted Pair Testing Equipment:

- 1) Cable tester will be NRTL certified for EIA/TIA TSB95.

- 2) The cable tester will have a wide variety of preprogrammed cable types as an integral part of its testing system and have the ability to test cables less than 6 feet (6ft.) from the test point.
- 3) All balanced twisted-pair field testers will be factory calibrated each calendar year by the field test equipment manufacturer as stipulated by the manuals provided with the field test unit. The calibration certificate will be provided for review prior to the start of testing.
- 4) Testing will be accomplished using level III or higher field tester that is loaded with the most current version of test software by the manufacturer of the test equipment.
- 5) Provide factory calibration report of field test equipment.

B. Testing Procedures:

- 1) Test each pair and shield of each cable for opens, shorts, grounds, and pair reversal. Correct grounded and reversed pairs. Examine open and shorted pairs to determine if problem is caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.
- 2) Test each UTP cable and passive components. Provide certification that entire installation of UTP cabling, equipment and jacks are NRTL certified meeting or exceeding a minimum of category performance specified on all four pairs of conductors.
- 3) Tests will be based on each pair of conductors and not the aggregate multiple pair results.
- 4) Test all installed cable segments end-to-end, from each telecommunications room backbone patch panel/cross-connect block panel to respective main cross connect, with a Signal Injector, Graphical Link Testing Meter and Time Domain Reflectometer (TDR) for compliance to latest TIA/EIA performance requirements, as well as NEXT, ELFEXT, structural return loss, alternating power sum, opens, shorts, continuity, cable length, and characteristic impedance.
- 5) Provide report indicating failures and what actions were taken to ensure a passing horizontal cable and its terminations. Any cable failing the certification test (Fail, Fail* or, Pass*) must have remedial work done to provide a full pass test result; Remediation may include retermination or replacement of the cable, which fails. No cables passing within tolerance only (Conditional Pass*) will be accepted.

C. Test results:

- 1) The test results information for each link will be recorded in the memory of the field tester upon completion of the test. The tester will be capable of storing test data in either internal or external memory. The external media used will be left to the discretion of the user.
- 2) Test results saved by the tester will be transferred into a Windows based database utility that allows for maintenance, inspection and archiving of these test records. A guarantee must be made that the measurement results are transferred to the PC unaltered as well as any printed reports generated from the software application.

- 3) Optional formats of data reporting are: comma separated variable (.csv), Portable Document File (.pdf) or compatible, plain text (.txt), or hypertext markup language (.html/.htm).
- 4) Test Results will include the following:
 - a. Applicable room number of jack location (room number per Contract Documents)
 - b. Applicable Telecommunications Room number
 - c. Circuit I.D. number with corresponding jack identifier
 - d. Wire Map – will include the following:
 - i. Continuity to the remote end
 - ii. Shorts between any two or more conductors
 - iii. Crossed pairs
 - iv. Reversed pairs
 - v. Split pairs
 - vi. Any other miswiring
 - e. Length
 - f. Insertion Loss
 - g. Near-end Crosstalk (NEXT) Loss
 - h. PS-NEXT (Power Sum Near End Cross Talk)
 - i. ELFEXT (Equal Level Far End Cross Talk)
 - j. PS-ELFEXT (Power Sum Equal Level Far End Cross Talk)
 - k. Propagation Delay
 - l. Delay Skew
 - m. Return loss
- 5) The Owner and Engineer reserve the right to observe testing and/or randomly sample completed links for conformance to project specifications.

3.03 Fiber Optic Cable Testing

- A. Fiber Optic Cable Test Equipment:
 - 1) Cable tester will be NRTL certified for TIA/EIA TSB95.
 - 2) Cable testers will be Optical Power Meter and High Resolution Optical Time Domain Reflectometer (OTDR). The cable tester will be NRTL certified for compliance to latest TIA/EIA Standard 568B performance requirements at 850, 1300 and 1550 nm.
 - 3) Testers will have been calibrated at least one year prior to use on this project. Contractor to provide proof to Owner if requested.
 - 4) All testing equipment (OTDR, Light Loss, Splicer etc.) will be owned by the Contractor. Contractor must prove ownership of equipment if requested.
- B. Cable segments and links will be tested from both ends of the cable for each of the construction phases. (Verify that cable labeling matches at both ends).
- C. The system will not be considered certified until the tester has acknowledged that the performance of the physical layer of the system has been fully tested and is operational at the completion of the installation phase.
- D. Testing Procedures:
 - 1) Perform each visual and mechanical inspection and electrical test, including optional procedures, stated in NETA ATS, Section 7.25. Certify compliance with test

parameters and manufacturer's written recommendations. Test optical performance with optical power meter capable of generating light at all appropriate wavelengths.

- 2) Prior to testing, all connectors will be properly cleaned with an approved product manufactured specifically for this purpose.
- 3) Prior to beginning testing, confirm that all testing equipment is fully charged or operating on building power. If the test equipment power levels drop below 50%, recharge unit or continue testing with a different (fully charged) tester.
- 4) Initially test optical cable with a light source and power meter utilizing procedures as stated in TIA TSB-140, ANSI/TIA/EIA-526-7, ANSI/TIA/EIA-526-14A, OFSTP-14A Optical Power Loss Measurements of Installed Multi-mode Fiber Cable Plant and ANSI/TIA/EIA-526-7 Measurement of Optical Power Loss in installed Single-Mode Fiber cable plant.
- 5) Measured results will be plus/minus 1 dB of submitted loss budget calculations. If loss figures are outside this range, test cable with Optical Time Domain Reflectometer (OTDR) to determine cause of variation. Correct improper splices and replace damaged cables at no charge to the Owner.

E. Multi-Mode Fiber Optic Cables:

- 1) Will be tested bi-directionally for length and attenuation at both the short and long wavelengths for Multi-Mode (850 and 1300 nm). This is Tier 1 testing as specified in TIA TSB-140. Test all Multi-Mode strands to ensure they are capable of transmitting 10 Gigabit Ethernet speeds.
- 2) The maximum insertion loss measured at 23 degrees C. will be 3.75dB/km @ 850 nm and 1.5 dB/km @ 1300 nm.

F. All cables will be tested after termination using a cable certification tester that contains the test equipment manufacturer's most current version of firmware.

G. Test all fiber optic cable segments end-to-end from the fiber optic backbone patch panel in the Equipment Room to each fiber optic backbone patch panel in each Telecommunications Room.

H. Broken or faulty strands will not be accepted. Any cable not fully functional with all strands usable will be replaced at no cost to the Owner.

I. Upon completion of testing, all connectors will be capped with a product made for that specific function by the connecting hardware manufacturer to prevent the contamination of the fiber from construction debris or other foreign objects.

J. Test Results:

- 1) The test results information for each link will be recorded in the memory of the field tester upon completion of the test. The tester will be capable of storing test data in either internal or external memory. The external media used will be left to the discretion of the user.
- 2) Test results saved by the tester will be transferred into a Windows based database utility that allows for maintenance, inspection and archiving of these test records. A guarantee must be made that the measurement results are transferred to the PC unaltered as well as any printed reports generated from the software application.

- 3) The test results information for each link will be recorded in the memory of the field tester upon completion of the test. The tester will be capable of storing test data in either internal or external memory. The external media used will be left to the discretion of the user.
 - 4) Test results saved by the tester will be transferred into a Windows based database utility that allows for maintenance, inspection and archiving of these test records. A guarantee must be made that the measurement results are transferred to the PC unaltered as well as any printed reports generated from the software application.
 - 5) Optional formats of data reporting are: comma separated variable (.csv), Portable Document File (.pdf) or compatible, plain text (.txt), or hypertext markup language (.html/.htm).
 - 6) Test results will include the following:
 - a. Telecommunications Room number
 - b. Location of fiber pull i.e. (Equipment Room # to Telecom Room #)
 - c. Patch panel # and location
 - d. Connector type
 - e. Distance
 - f. Wavelength tested
 - g. Technician who performed the testing
- K. The Owner and Engineer reserve the right to observe testing and/or randomly sample completed links for conformance to project specifications.

End of Section

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

ACCEPTANCE CRITERIA:

The Owner will verify that all required activities have been performed in a final joint walk-through with the Contractor prior to system acceptance.

There shall be no provisions for automatic acceptance. A phased acceptance test maybe performed; however, acceptance of any phase is conditional on the acceptance of the project as a whole. Full payment will only be made after full and complete acceptance of the entire system. Acceptance shall only occur based on the written notification to the Contractor from the Owner. The following criteria must be met:

1. All cables have been tested and shown as meeting all specifications to the satisfaction of the Owner. All test reports required shall have been submitted and approved by the Owner assigned project manager.
2. All outlets are completely installed and operational in the specified locations.
3. All required patch panels are installed and operational.
4. All patch cables, cross connects, and extension cables have been delivered.
5. Final as-built documentation has been provided by the contractor.
6. Training and tools have been provided to the Owner cable management personnel in the maintenance and use of the installed cabling systems.
7. Each fiber has been tested end-to-end and a written report of signal loss and continuity has been provided.
8. All fire-stops have been installed.
9. The site is clean and neat, ready for permanent use by the Owner.

After the interior wiring system is completed and at such time as the Engineer or Owner's representative may direct, the Contractor shall conduct an operating test for approval. The tests shall be performed in the presence of the authorized representative of the Engineer and the installation shall be demonstrated to operate in accordance with the requirements of this specification. The Contractor shall furnish all instruments and personnel required for the test. The Contractor shall have sufficient tools and personnel available at the scheduled inspection to remove panel fronts, device plates, etc., as required for proper inspection of equipment, devices and wiring installation as may be required by the inspectors. Any material or workmanship which does not meet with approval of the engineer shall be promptly removed, repaired or replaced as directed, at no additional cost to the Owner.

CLEANING AND PAINTING:

Prior to final inspection, all equipment having factory finishes shall be thoroughly cleaned inside and outside. All damaged surfaces shall be replaced or refinished by Contractor, with paint same as original manufacturer. Engineer shall determine whether the damaged surface is to be replaced or painted.

RECORD DRAWINGS AND DOCUMENTATION PACKAGE:

1. Record Drawings
 - a. The Contractor shall maintain accurate records of all deviations in work as actually installed from work indicated on the drawings. On completion of the project, two (2) complete sets of marked-up prints shall be delivered to the Architect.
2. Documentation package
 - a. The successful bidder shall provide one (1) system documentation package on CD and one (1) system documentation paper copy for the installed integrated system. The documentation package shall provide the owner with a comprehensive guide for all operation and maintenance procedures for the "as installed" system. A system block diagram shall indicate the functional relationship between all sub-systems and all elements within individual sub-systems. A cabling schematic shall indicate interconnect wiring with respective numbering or other identification codes and termination block assignment. If requested, schematic drawings shall be provided for each active and passive circuit used in the completed system. All schematic drawings shall indicate the electrical value of each component and its circuit by use of standard electronic symbols.

TRAINING:

A. ICS System

1. Training shall include a minimum of 16 hours of user training for the end user. Training shall be provided at the school or owner designated location in a classroom setting. Training shall be divided into two (2) groups, system administrator and teacher. Training shall also include a video and/or audio format on CD-Rom and shall be formatted for use on individual CD-Rom.

B. Telephone

1. Training shall include a minimum of 8 hours of user training for the end user. Training shall be provided at the school or owner designated location in a classroom setting.

OPERATING AND MAINTENANCE INSTRUCTIONS:

Unless directed otherwise elsewhere in these specifications, the Contractor shall compile and bind two sets of all manufacturer's instructions and descriptive literature on all items of equipment furnished under this work. These instructions shall be delivered to the Engineer for approval prior to final inspection. Instructions shall include operating and testing procedures and a parts list of all equipment. The Contractor shall instruct the Owner's personnel in the proper operation of all systems and equipment. The front of the binder shall be titled "Technology Systems Operating and Maintenance Instructions", with name of the job and firm name of the Contractor.

WARRANTY:

The Contractor shall submit upon completion of the work, a warranty by his acceptance of the contract that all work installed will be free from defects in workmanship and materials. If, during the period of one year, or as otherwise specified from date of Certificate of Completion and acceptance of work, any such defects in workmanship, materials, or performance appear, the Contractor shall, without cost to the

Owner, remedy such defects within reasonable time to be specified in notice from the Architect. In default, the Owner may have such work done and charge cost to Contractor.

END OF SECTION
END OF SPECIFICATIONS